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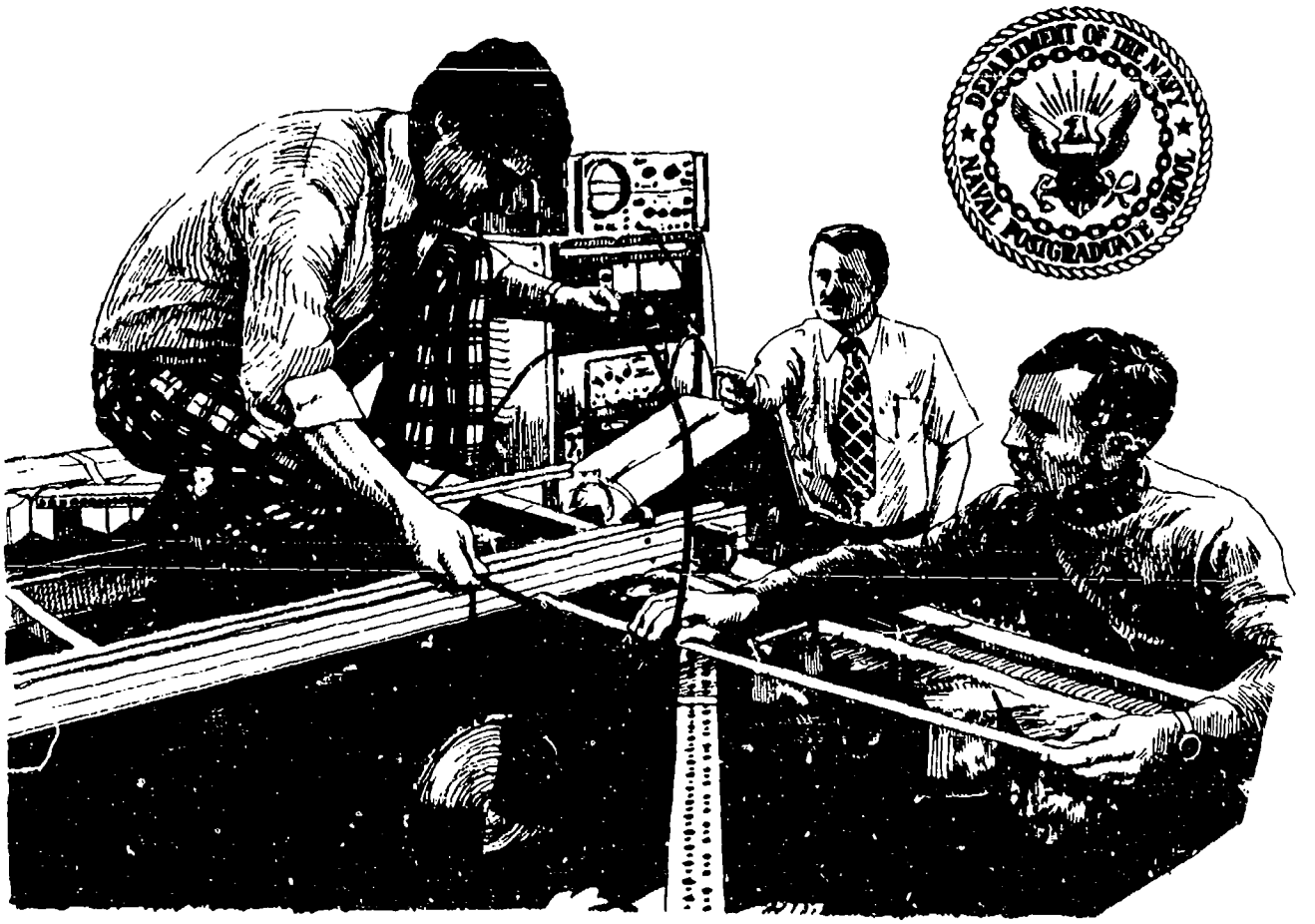
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MONTEREY, CALIFORNIA

NAVAL POSTGRADUATE SCHOOL
Monterey, CA 93943

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Superintendent

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DOCTOR OF PHILOSOPHY

SHORT WAVE MODULATION DUE TO INFRAGRAVITY WAVES IN THE NEARSHORE ZONE, WITH APPLICATIONS

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The omni-present flow frequency wave motion (30-300 sec) contains a substantial fraction of the total wave energy inside the surf zone. A more complete description of nearshore wave processes considers incident short period wind waves superposed on, and interacting with, long standing waves. The wind waves are modulated in amplitude, wavenumber and direction due to relatively slowly varying depth changes caused by the long waves. The energy in the wind wave band is enhanced by side band growth at the sum and difference frequencies of short and long waves (order 15% at the shoreline). The modulation is identified in the analysis of field data as a positive correlation between the long waves and the wind wave envelope near the shoreline. Considering oblique incident waves, a steady longshore current showing a non-vanishing current at the shoreline is found as a result of the non-linear interaction between monochromatic incident and infragravity waves. An analytical solution describing the unsteadiness of the longshore current is developed. Applying the derived longshore current solution, longshore sediment transport is reformulated to include the infragravity waves, giving improved comparisons with field measurements.

Doctor of Philosophy
September 1986

Advisor: E.B. Thornton
Department of
Oceanography

FORMULATION AND ANALYSIS OF SOME COMBAT-LOGISTICS PROBLEMS

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Models are developed to study the readiness and subsequent combat performance of an air-interceptor squadron facing sudden attack. These models necessarily link combat with logistics. The models are mainly analytical and not a Monte Carlo simulation, and can be used to indicate the optimal weapon system to be procured and to study the effect of peacetime decisions on combat outcomes. The logistics models use the matrix-geometric approach to study the general multivariate repairman problem, with the possibility of simultaneous component failures. A repairman assignment problem is formulated and solved using a multivariate continuous-time Markov decision process. Surprise scenarios are analyzed and represented explicitly. Air-to-air combat is modelled as a transient multivariate continuous-time discrete-state Markov process. Diffusion theory is used to approximate the solutions. The reason for using diffusions is ease of interpretation and computational economy. A comparison with simulation results shows that diffusion yields good approximations. Improvement tc the diffusion approximation is provided by applying "large deviations" procedures.

Doctor of Philosophy
September 1986

Advisor: D.P. Gaver
Department of
Operations Research

RECIPROCITY CALIBRATION IN A PLANE WAVE RESONATOR

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M.S., Naval Postgraduate School, 1978

A non-standard method for the electroacoustic reciprocity calibration of a condenser microphone is theoretically developed and experimentally employed to calibrate a W.E.640AA laboratory standard microphone. The average experimental calibration so obtained was found to be in absolute agreement with a pressure coupler comparison calibration of the same microphone made at the National Bureau of Standards to within an experimental uncertainty (sigma) of ~ .03 dB over the frequency range of 245 to 1470 Hz using a 70 cm. plane wave resonant cavity, and to within an experimental uncertainty (sigma) of ~ .06 dB over the frequency range of 735 to 1470 Hz using a 23 cm. plane wave resonant cavity. Above 1470 Hz, the difference between the resonant plane wave reciprocity calibrations and the pressure coupler comparison calibration increased linearly with frequency to a maximum of ~ .61 dB at 5145 Hz.

Beginning with theory previously published by Isadore Rudnick, reciprocity equations for the open circuit voltage receiving sensitivity are optimized for experimental measurements in a plane wave resonant cavity to include the effects of finite microphone compliance and the non-adiabatic boundary conditions. Two right cylindrical plane wave resonant cavities of different dimensions were constructed to provide a self consistency check on the method.

A preliminary comparison of the theory for a free field reciprocity calibration, a pressure coupler reciprocity calibration, and a plane wave resonant reciprocity calibration is made to illustrate the common physics pertinent to the reciprocity principle that underlies the three methods.

Experimental calibrations based upon free field reciprocity were made alternately with plane wave resonant reciprocity calibrations to provide an ongoing experimental comparison when combined with published diffraction effects for a standard mounting of a W.E.640AA laboratory

standard microphone. The National Bureau of Standards comparison calibration was based upon an absolute pressure coupler reciprocity calibration and was obtained shortly after the resonant reciprocity calibration measurements were complete.

Doctor of Philosophy
December 1985

Advisor: S.L. Garrett
Department of
Physics

A NUMERICAL SIMULATION OF THE MEI-YU FRONT
AND THE ASSOCIATED LOW-LEVEL JET

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The Mei-Yu front is a quasi-stationary belt of heavy precipitation imbedded in the summer monsoon trough over East Asia. This work used a two dimensional frontogenesis model to study the Mei-Yu front, especially its associated low-level jet (LLJ) which often occurs during intense convection. Several numerical experiments were carried out to simulate the quasi-steady frontal structures in different environments. The results resemble many observed features, such as the stronger temperature and moisture gradients in the midlatitude fronts and the stronger horizontal shear and LLJ in the subtropical fronts. The LLJ is most conspicuous in the subtropical simulation when high humidity and surface fluxes are included. The results further suggest that the LLJ is developed through the Coriolis torque that is exerted by the low-level poleward branch of a "reversed Hadley cell" equatorward of the front. This thermally direct cell is different from the normal cross-frontal secondary circulation. Its development depends on the occurrence of intense convection.

Doctor of Philosophy
September 1986

Advisors: C.-P. Chang
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Department of
Meteorology

POWER LINE NOISE MODELS AND ENERGY DETECTION IN THE HIGH FREQUENCY RADIO BAND

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B.S.E.E., United States Naval Academy, 1978
M.S.E.E., Naval Postgraduate School, 1984

Electromagnetic interference from power lines is one of the main sources of man-made interference to communications in the high frequency (HF) radio band. Two types of radio interference generated by power lines are gap-type noise caused by electric discharges across line hardware and corona noise caused by the partial breakdown of the air due to the high electric fields around transmission line conductors. Using original data, this research has developed a parameter based model of gap-type and corona noise, that allows the fundamental noise mechanisms to be mathematically or physically simulated. An expression for the power spectral density (PSD) of gap-type noise and corona is derived. The energy detection problem is formulated, and using analytical results based on the Hall model for radio noise, a robust energy detection receiver is developed. Tests of this receiver using actual and simulated data are described.

Doctor of Philosophy
June 1986

Advisor: S. Jauregui
Department of
Electrical and Computer
Engineering

REMOTE MEASUREMENT OF THE ATMOSPHERIC ISOPLANATIC ANGLE AND DETERMINATION OF REFRACTIVE TURBULENCE PROFILES BY DIRECT INVERSION OF THE SCINTILLATION AMPLITUDE COVARIANCE FUNCTION WITH TIKHONOV REGULARIZATION

Kurt Benedict Stevens
Captain, United States Air Force
B.S., United States Air Force Academy, 1979
M.S., Naval Postgraduate School, 1983

It is difficult to propagate a diffraction-limited laser beam through the atmosphere, since the atmosphere contains random index of refraction fluctuations. Two parameters that characterize the atmosphere for optical propagation are the atmospheric isoplanatic angle, θ_0, and the refractive turbulence structure parameter, C_n^2. This dissertation deals with improved methods for measuring θ_0 and C_n^2 profiles using optical techniques.

By apodizing the receiver telescope aperture, one can improve the weighting function for isoplanatic angle measurement substantially over previous systems. We find that the weighting function is not significantly affected by inner scale changes with altitude and that the error in isoplanatic angle measurement from strong low altitude turbulence ($z < 1$ km) with this weighting function is small. Data collected with the improved isoplanometer shows temporal trends in the isoplanatic angle on the order of 90 seconds that have not been observed before.

Direct inversion of the amplitude covariance function (including aperture averaging effects) to yield refractive turbulence profiles is known to be ill-posed. I suppress this condition using Tikhonov regularization and reproduce refractive turbulence profiles from actual C_n^2 data with some success.

Doctor of Philosophy
December 1985

Advisor: D.L. Walters
Department of
Physics

AERONAUTICAL ENGINEER

SENSITIVITY AND ROBUSTNESS ANALYSIS
FOR SEA-SKIMMING MISSILE

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B.S., Escola Naval, R.J., Brasil, 1970
B.S., Universidade de Sao Paulo, S.P., Brasil, 1976

This thesis presents the application of EIGENVALUE SENSITIVITY ANALYSIS and SINGULAR VALUE ANALYSIS to the control of a SEA-SKIMMING supersonic missile, in the vertical plane.

The study is divided in four basic parts:

a) The development of the model.

b) EIGENVALUE SENSITIVITY ANALYSIS with respect to the variation of the aerodynamic parameters of the autopilot/airframe of the missile.

c) Analysis of the time response with respect to the variation of the aerodynamic parameters.

d) Robustness analysis and improvement of the system, using the SINGULAR VALUE ANALYSIS.

All the analysis is based on results of simulation programs using the software available at the Naval Postgraduate School.

Aeronautical Engineer
September 1986

Advisor: D.J. Collins
Department of
Aeronautics

CONTRIBUTION TO THE ANALYSIS OF HIGH-LIFT AIRFOIL AERODYNAMICS

Hee Woo Lee
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B.S., Korean Air Force Academy, 1979

This thesis treats the problem of incompressible two-dimensional steady flow past airfoils or airfoil combinations at large angles of attack. A panel method was developed to compute the inviscid flow over two cylinders, airfoil-flap combinations and airfoils in ground effect. In addition, Cebeci's viscous/inviscid interaction method was applied to several airfoils and compared with available experimental data. The agreement is generally quite encouraging.

Aeronautical Engineer
March 1986

Advisor: M.F. Platzer
Department of
Aeronautics

PARTICLE SIZING IN A SOLID-PROPELLANT ROCKET MOTOR USING SCATTERED LIGHT MEASUREMENTS

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B.S., United States Naval Academy, 1978

An experimental investigation was performed to determine, in situ, the change in mean particle size across the exhaust nozzle of a small metallized solid-propellant rocket motor. Light scattering profiles were recorded at both the exhaust and the entrance of the nozzle. The experimental method used provided excellent results within the exhaust. However, combustion light at the wavelength of the transmitted light hampered light scattering measurements within the motor. Particle size measurements were consistent with the sizes found in the collected exhaust products.

Aeronautical Engineer
Master of Science in
Aeronautical Engineering
December 1985

Advisor: D.W. Netzer
Department of
Aeronautics

AN ANALYSIS OF SYMMETRIC REINFORCEMENT OF GRAPHITE/EPOXY HONEYCOMB SANDWICH PANELS WITH A CIRCULAR CUTOUT UNDER UNIAXIAL COMPRESSIVE LOADING

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B.S., United States Naval Academy, 1969

An experimental and computational analysis was made of stress/strain concentrations around a reinforced circular 1.00 inch diameter circular cutout in HMF330C/34 (cloth) graphite/epoxy (G/Ep) and fiberglass/phenolic honeycomb sandwich panels under uniaxial compressive loading. The test specimens were 10.00" x 8.50", eight ply quasi-isotropic ($[0,\pm45,90,\text{core}]_s$) panels. The reinforcement consisted of either one or two additional G/Ep plies co-cured to the outside of each facesheet. Three general reinforcement configurations were considered: round, square and strips parallel to the applied load. The analytical results demonstrated that small amounts of reinforcement could greatly increase the strength-to-weight ratio. The indication was that concentrating the reinforcement close to the cutout yielded the greatest decrease in stress concentration. A program of experimental validation of the analytical results experienced some problems with premature panel failure caused by the facesheets separating from the core. It generally confirmed the analytical results, however. Further experimental tests on promising reinforcement configurations are justified based on these results. Properly designed reinforcement around cutouts in composite panels can significantly reduce the stress concentration and holds the promise of far lighter and stronger aerospace structures.

Aeronautical Engineer
December 1985

Advisor: M.H. Bank
Department of
Aviation Safety

AN EXPERIMENTAL INVESTIGATION OF SOOT SIZE AND FLOW FIELDS IN A GAS TURBINE ENGINE AUGMENTOR TUBE

Dave Jeffrey Urich
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B.S., Pennsylvania State University, 1977

An instrumented augmentor tube was constructed and used to obtain velocity and temperature profile measurements as a function of augmentor inlet gas generator nozzle spacing for use in Phoenics computer code validation.

Additionally, optical particle size measurement instrumentation in the form of a three wavelength transmission device and a two forward-angle scattering device using a helium-neon laser was designed, constructed and utilized for determining the effects of the augmentor flow on the change in soot size across the length.

Various smoke suppressant fuel additives were also evaluated for their effect on the soot size changes across the augmentor tube length.

The initial tests indicated that particle size increased significantly across the augmentor tube length.

Aeronautical Engineer
June 1986

Advisor: D.W. Netzer
Department of
Aeronautics

DEVELOPMENT OF A DATA ACQUISITION SYSTEM TO AID IN THE AERODYNAMIC STUDY OF VARIOUS HELICOPTER CONFIGURATIONS

Patrick A. Witt
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

This thesis developed a data acquisition system to be used in conjunction with the 3.5' x 5.0' low speed wind tunnel at the Naval Postgraduate School. Interactive graphic programs were developed to aid in data acquisition and analysis. In addition, the internal balance that was designed by Major Scott Mair and Major Chris Sargent was redesigned to correct some problems encountered with the drag component. The balance was also intrumented to record the pitch and yaw moment components. A calibration rig was designed and constructed in order to evaluate the interactions of the different components. The equipment used and programs developed for data acquisition and analysis were adequate. However, balance calibration revealed problems with the calibration rig and location of the roll component strain gage. Both of these problems will have to be corrected before accurate readings can be expected from this balance design.

Aeronautical Engineer
March 1986

Advisor: D.M. Layton
Department of
Aeronautics

ELECTRICAL ENGINEER

THE RISC ARCHITECTURE AND COMPUTER PERFORMANCE EVALUATION

Manuel Filipe Pedrosa de Barros
Lieutenant, Portuguese Navy
B.S., Escola Naval, 1978

A definition of Reduced Instruction Set Computers is developed.

A computer performance model which allows the evaluation of architectural alternatives is presented.

An example on the use of the model to compute the performance alternatives for a given application is presented to study the effect of the addition of an instruction to a processor instruction set.

Electrical Engineer
Master of Science in
Electrical Engineering
March 1986

Advisor: H.B. Rigas
Department of
Electrical and Computer
Engineering

TWO-DIMENSIONAL BEAMFORMING USING A FREQUENCY DOMAIN COMPLEX LEAST MEAN-SQUARE (LMS) ADAPTIVE FILTER

Francis Chan
Lieutenant, United States Navy
B.S., The University of Rochester, 1979

The complex LMS adaptive algorithm developed by Widrow [Ref. 1] is used in the frequency domain to estimate the azimuth and elevation angles of a plane wave incident upon a planar array. The complex LMS algorithm is applied to two cases. The first case is a passive detection problem. The second case is a pulse communication problem. In both cases, complex weights are determined using the complex LMS algorithm which cophase all of the output electrical signals from the planar array. Three versions of the complex LMS algorithm are studied and their performances are compared.

Electrical Engineer
Master of Science in
Electrical Engineering
June 1986

Advisor: L.J. Ziomek
Department of
Electrical and Computer
Engineering

A SERIAL BUS ARCHITECTURE FOR PARALLEL PROCESSING SYSTEMS

Kevin J. Delaney
Lieutenant, United States Navy
B.S.E.E., United States Naval Academy, 1979

One of the most serious deterrants to the development of multiple processor architectures has been the problem of providing adequate communication between the discrete processing elements. This paper examines two communications-based constraints.

The first constraint is related to the physical structure of the VLSI chip. The wider the communication path the more pins are needed to effect the data transfer. As Integrated Circuits grow in computational power, more communication capacity is needed, pushing designs closer to the pin limitations of the packaging technology.

The second constraint, somewhat related to the first, is the limited speed with which data can be transmitted via internal channels. Typical speeds one can achieve on a single wire are on the order of 1 Gbps. The recent development of an Optoelectronic Multiplexer may allow VLSI chips to communicate at rates up to 7 Gbps. An architecture for a parallel processing computer which takes advantage of this new capability is presented. The feasibility of a single-chip parallel-processor based on the Optoelectronic Multiplexer is examined by projecting current trends in processor speed, power, and transistor count into estimates of throughput for a multi-processor IC.

Electrical Engineer
Master of Science in
Electrical Engineering
September 1986

Advisor: L.W. Abbott
Department of
Electrical and Computer
Engineering

KALMAN FILTER REAL TIME TRACKING USING MICROPROCESSORS AND A NEW LANGUAGE FOR MILITARY SOFTWARE

Jose Alberto Fernandes Ferreira
Captain, Brazilian Air Force
B.S., Instituto Tecnologico de Aeronautica, 1977

A sequential Extended Kalman filter routine, implemented in the "C" language, is developed for an embedded computer application. The design takes into account the real time constraints imposed by the sampling time of the data. Filter measurements consist of four (4) transit times generated by torpedo instrumentation in a TEST RANGE facility, and they are nonlinear functions of the coordinates of the torpedo. Memory, speed efficiency, and portability are emphasized in the software design.

The program was tested, using simulated trajectories, in an IBM-PC and in a CIE 680/30 microcomputers. Limitations in handling small floating point numbers degraded the performance of the algorithm in the CIE machine which could not track 1/4-G maneuvers.

Electrical Engineer
March 1986

Advisor: H. Titus
Department of
Electrical and Computer
Engineering

ADAPTIVE MODELING OF THE DYNAMICS OF AUTONOMOUS LAND VEHICLES

James H. Kessler, IV
Captain, United States Marine Corps
B.S., Rensselaer Polytechnic Institute, 1977

This study examines the feasibility of identifying the dynamic parameters of autonomous land vehicles. Initially a simulation study is done using a simplified vehicle model and three different identification schemes. The parameter estimator which has the best characteristics is then used on an improved model to determine if this approach can be used to obtain the parameters of multi-wheeled vehicles.

Electrical Engineer
Master of Science in
Electrical Engineering
June 1986

Advisor: R.B. McGhee
Department of
Computer Science

A LANGUAGE CAPABLE OF DESCRIBING COMPUTER ARCHITECTURE

Luis Manuel da Cunha de Sousa Machado
Lieutenant, Portuguese Navy
B.S., Escola Naval, 1978

A fully automated and effective aid for computer system design is of great interest in increasing designers' efficiency and reducing costs. Such a system, which requires unified and compatible tools for designing and analyzing computer architectures is still missing. Inserted in a research program by Professor Rigas to develop a complete automated design system, this work focuses on designing a formal language capable of describing the data flow of a computer. The language is capable of describing the interconnections between the major data flow components and the control of the flow of information. Using this language, several decompositions of the intended system can be specified and studied to find the optimal one.

Electrical Engineer
Master of Science in
Electrical Engineering
March 1986

Advisor: H.B. Rigas
Department of
Electrical and Computer
Engineering

MECHANICAL ENGINEER

STRAIN DEPENDENT DAMPING CHARACTERISTICS OF A HIGH DAMPING MANGANESE-COPPER ALLOY

Dwight D. Dew
Lieutenant Commander, United States Navy
B.A., University of South Florida, 1975

This paper presents the studies on measurement techniques developed for the determination of strain-dependent damping characteristics of materials in an air environment. The material is a high damping manganese-copper alloy called Sonoston. The measurement techniques employ cantilevered flat beam specimens in bending and cylindrical specimens in torsion. The specimens were subjected to three different heat and aging treatments. Pure randon and sinusoidal sweep excitations are used as an excitation source in the frequency range of 20 to 500 Hz. Miniature accelerometers and strain gages were mounted on the specimens to obtain both input excitation and output responses. The results of the investigation are presented graphically as damping factor vs. resonant frequency, damping factor vs. strain damping factor vs. input acceleration, strain vs. resonant frequency, strain vs. input acceleration, and input acceleration vs. resonant frequency.

Mechanical Engineer
Master of Science in
Mechanical Engineering
September 1986

Advisor: Y.S. Shin
Department of
Mechanical Engineering

MARINE GAS TURBINE MODELING FOR MODERN CONTROL DESIGN

Vincent J. Herda
Lieutenant, United States Navy
B.S., United States Naval Academy, 1980

The search for improved performance of U.S. Navy ships has led to more complex propulsion systems consisting of multiple, interacting inputs. Classical control theory does not effectively exploit these interactions. Modern control theory provides a systematic method of dealing with multiple interacting inputs to achieve improved system performance. One of the the most highly developed modern control techniques is the linear quadratic regulator (LQR) method. Essential to the application of this method is the formulation of a state space description of the plant. In this paper a nonlinear dynamic propulsion system model is developed from experimental data and used to formulate a state space model.

Mechanical Engineer
Master of Science in
Mechanical Engineering
June 1986

Advisor: D.L. Smith
Department of
Mechanical Engineering

FORCED CONVECTION HEAT TRANSFER FROM A FINNED ARRAY WITH AN ADJUSTABLE OUTER CHANNEL BOUNDARY

Terry Lynn Mellon
Lieutenant, United States Navy
B.E.M.E, Vanderbilt University, 1978

An analysis was made of the heat transfer characteristics of an array of longitudinal fins with an adjustable outer channel boundary and a constant heat flux into the base of the array. The channel boundary could be moved to provide fin tip clearance ratios from zero to twice the fin height. Velocity variations in the inter-fin spaces and the open channel adjacent to the fin tips caused a variation in the calculated heat transfer coefficients along the height of the finned array, with the maximium coefficient occurring in the region of maximum velocity. It was shown that fin tip heat loss was a function of the clearance between the fin tip and the channel boundary, and that the maximum heat loss could occur on or near the fin tip. It was also shown how the tip heat loss affected the overall heat transfer characteristics of the array. Centerline velocity profiles and streamline profiles were developed for laminar flow with the finned array both heated and unheated. For the heated condition, two heat fluxes were used with three different clearance ratios. Temperature profiles within the fin were developed for the lower heat flux for both laminar and turbulent flow. Laminar flow results were compared to the analytical work of Acharya and Patankar.

Mechanical Engineer
Master of Science in
Mechanical Engineering
June 1986

Advisor: A.D. Kraus
Department of
Mechanical Engineering

FILM CONDENSATION OF STEAM ON EXTERNALLY ENHANCED HORIZONTAL TUBES

Evagelos S. Mitrou
Lieutenant, Hellenic Navy
B.S.M.E., Hellenic Naval Academy, 1976

Heat-transfer measurements were made for filmwise condensation of steam on externally enhanced horizontal tubes under vacuum and at atmospheric pressure. Data were obtained for copper tubes with cicular fins of rectangular, triangular, trapezoidal, and parabolic cross sections, for spiral fins of triangular cross section, for commercially available finned tubes and for wire-wrapped tubes. Four spirally finned tubes from each of Cu, Cu-Ni, Al, and stainless steel and two tubes with fins of rectangular cross section from each of Cu-Ni and Al were manufactured and tested to investigate the effect of thermal conductivity.

Among spirally finned tubes, the optimum fin pitch was found to be 1.6 mm. The tubes with a parabolic fin shape showed the best performance with steam-side enhancements of 4.1 and and 6.2 under vacuum and at atmospheric pressure, respectively. Enhancement ratios as high as 3.5 and 2.1 were obtained under vacuum and at atmospheric pressure, respectively, for the commercially available finned tubes. The heat-transfer performance decreased with decreasing tube metal thermal conductivity.

For the wire-wrapped tubes, an optimum pitch to wire diameter ratio of about 5.1 was found, with steam-side enhancements of about 1.9 and 2.2 under vacuum and at atmospheric pressure, respectively. A recent theoretical analysis of laminar film of low-surface-tension fluids on wire-wrapped tubes was modified to include the condensate retention of the tube due to the high surface tension of water. Agreement between this modified analysis and the experimental data was favorable.

Mechanical Engineer
Master of Science in
Mechanical Engineering
March 1986

Advisors: P.J. Marto
A.S. Wanniarachchi
Department of
Mechanical Engineering

COMPUTER SIMULATION AND EXPERIMENTAL VALIDATION OF A DYNAMIC MODEL (EQUIVALENT RIGID LINK SYSTEM) ON A SINGLE-LINK FLEXIBLE MANIPULATOR

Robert P. Petroka
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

Flexibility effects on robot manipulator design and control are typically ignored which is justified when large, bulky robotic mechanisms are moved at slow speeds. However, when increased speed and improved accuracy is desired in robot system performance it is necessary to consider flexible manipulators. This project simulates the motion of a single-link, flexible manipulator using the Equivalent Rigid Link System dynamic model and experimentally validates the computer simulation results. Validation of the flexible manipulator dynamic model is necessary to ensure confidence of the model for use in future design and control applications of flexible manipulators.

Mechanical Engineer
Master of Science in
Mechanical Engineering
June 1986

Advisor: L. Chang
Department of
Mechanical Engineering

CYCLIC STRAIN AMPLITUDE AND HEAT TREATMENT EFFECTS ON THE HIGH DAMPING BEHAVIOR OF INCRAMUTE ALLOY UNDER RANDOM VIBRATION LOADING IN THE 50-1000 HZ FREQUENCY RANGE

John Reskusich
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1975

The strain dependence of damping in the alloy INCRAMUTE (58 Cu, 40 Mn, 2 Al), aged at 400°C for various times, was determined using a modified version of the resonant dwell technique. Cantilever beam specimens were vibrated at their first three resonant modes (50-1000 Hz) at room temperature. The highest specific damping capacity (SDC), 68%, was achieved with an average peak strain of 2.27×10^{-3} in mode 1 at a resonant frequency of 49.2 Hz for the 16-hour aging condition.

The INCRAMUTE alloy exhibited variations of Young's modulus, lattice parameter, hardness, tensile hysteresis, and SDC with aging, which is typical of Cu-Mn binary alloys with greater than 50% Mn. However, no FCT transformation or microtwin banding was observed in the aged specimens under zero stress conditions, as verified by transmission electron microscopy (TEM), X-ray diffraction (XRD), and optical microscopy. The characteristic microstructure observed at the TEM level was a "mottled" or a "tweed" pattern in both the as-quenched and the aged specimens. Neither (200) nor (220) peak splitting corresponding to tetragonality was detected from XRD traces of aged samples. Based on the results, an interpretation of the microstructural damping characteristics of INCRAMUTE is presented.

Mechanical Engineer
Master of Science in
Mechanical Engineering
September 1986

Advisor: J.A. Perkins
Department of
Mechanical Engineering

THIRTY-TWO NODES HEXAHEDRONAL ELEMENT SUBROUTINE FOR MULTI-PURPOSE PROGRAM MEF

Anan Sukaneeyouth
Lieutenant, Royal Thai Navy
B.S., Royal Thai Naval Academy, 1978

A general finite element program of moderate complexity called MEF is organized to contain a library of one, two, and three-dimensional elements for the solution of problems from a wide variety of disciplines. A cubic, thirty-two node, three dimensional isoparametric element was developed. With such an element very complex structures could be solved with a very course mesh.

Mechanical Engineer
Master of Science in
Mechanical Engineering
September 1986

Advisor: G. Cantin
Department of
Mechanical Engineering

MASTER OF SCIENCE

IN

AERONAUTICAL ENGINEERING

EXPERIMENTAL PROCEDURE FOR LIFETIME TESTING OF GRAPHITE BUNDLES UNDER CONSTANT LOAD

Fred D. Carozzo, Jr.
Lieutenant, United Statos Navy
B.S., University of Nebraska-Lincoln, 1978

An experimental procedure is presented for lifetime testing of graphite bundles under constant load. The attributes of the experiment are expedience in implementation and a substantial accumulation of information equivalent to a large number of single filament tests. To achieve the objectives of the experiment a specially adapted Instron machine was used with a digital process/controller. Two trial tests were conducted using Hercules high strength graphite. The preliminary results are presented and the effects of inter-fiber friction evaluated.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: E.M. Wu
Department of
Aeronautics

COMPUTER CONTROLLED DATA ACQUISITION AND ANALYSIS

John Anthony DiMicell
Lieutenant, United States Navy
B.S., Manhattan College, 1977

A computer-controlled data acquisition and analysis system was designed, built, and tested. All of the required elements of a complete data acquisition system were assembled, including transducers, amplifiers, signal conditioners, display devices, computer interface, comput and related software. A digital multiplexer was constructed to multiplex up to 16, 16-bit channels for input into the computer. A computer program was written to bring the various parts of the system together. An experiment, Analysis of an Airfoil by Pressure Distribution, was used as a vehicle to test the system. The final output of the data acquisition system, including graphical information, compared favorably with previous results from an older data acquisition system in use.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: S. Bodapati
Department of
Aeronautics

COMPUTER PROGRAM FOR CONCEPTUAL HELICOPTER DESIGN

Robert L. Drake
Lieutenant, United States Navy
B.A., University of Louisville, 1974

The conceptual phase of helicopter design requires that many calculations and iterations be completed. Often specifications are exceeded in the latter stages of the design, requiring a complete rework of the design to bring these specifications within limits.

This thesis develops a program to be used in the Helicopter Design - AE-4306 course taught by the Department of Aeronautics at the Naval Postgraduate School, Monterey, California to alleviate many of the tedious calculations required in conceptual design development. This program provides the student with the ability to perform trade-off studies to enhance design parameters.

Master of Science in
Aeronautical Engineering
September 1976

Advisor: D.M. Layton
Department of
Aeronautics

CONTROLLED DIFFUSION COMPRESSOR BLADE WAKE MEASUREMENTS

John W. Dreon, Jr.
Lieutenant, United States Navy
B.S., University of Virginia, 1978

A Controlled-Diffusion compressor stator blade-element design was re-tested in a subsonic cascade wind tunnel to obtain data with which to assess viscous computational prediction methods. Tests were conducted near design and toward stall conditions at Mach 0.28 and Reynolds number of 774000. Loss coefficient, diffusion factor and AVDR were determined by mass averaging pneumatic pressure probe survey measurements. Wake velocity profiles were measured from 0.12 to 1.77 chordlengths downstream. Concentration was placed on the verifications of accuracy by careful calibration, multiplicity and exchange of survey probes. Cylindrical probes were found not to measure wake yaw angles as accurately as conical probes. Experimental results showed that losses were dependent on Reynolds number and that all blade-element performances were independent of the down-stream axial location at which they were determined.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: R.P. Shreeve
Department of
Aeronautics

FLOW FIELD MEASUREMENTS OF AN AIRFOIL WITH A DEFLECTED SPOILER USING A TWO-COMPONENT LDV SYSTEM

Michael J. Foreman
Lieutenant, United States Navy
B.S., U.S. Naval Academy, 1979

The primary goals of this thesis included developing a computer-integrated LDV system, utilizing the LDV system to measure the mean and fluctuating quantities of the flow field of an airfoil-spoiler system, and comparing the results of the experiment with previous hot-wire anemometry results.

The experiment was conducted in the NASA Ames 11 cm x 25 cm indraft tunnel. A two-component LDV system was developed and set up, and measurements were obtained along the upper surface of the airfoil (ahead of and behind the spoiler) as well as in its wake, close to the trailing edge. Mean velocity profiles and turbulent stresses were calculated and comparisons were made with previous hot-wire experiments.

It was shown that the hot-wire technique is not as accurate as the LDV in highly turbulent regions of the flow field. The hot-wire results are also not reliable in the near wake region due to the inherent reverse flow. In other, less turbulent, regions of the flow field where there is no reverse flow, good agreement between previous hot-wire data and present experimental results was found.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: S. Bodapati
Department of
Aeronautics

DESIGN, DEVELOPMENT, AND TESTING OF SOFTWARE FOR AUTOMATION OF NAVAL TACTICAL AVIATION SQUADRONS

Joseph A. Gattuso
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

The Light Attack and Strike Fighter communities employ manual information systems for administrative duties. This antiquated method of handling information results in degraded combat readiness as flightcrews expend inordinate amounts of time away from aviation or tactical concerns. The communities must alter their methods of information management to re-align pilot priorities, permitting flightcrews to become more proficient aviators. The complexity of modern Naval aircraft and the proliferation of modern air defenses demand this shift in priorities.

This thesis is an attempt to automate the Operations department of an A-7 or F/A-18 squadron. Subsequent additions may extend to other departments. The Squadron Information Management System (SIMS) is flexible, supportable, and transportable.

The SIMS will help slay the paper dragon in the TACAIR community, letting the pilots concentrate on their most demanding responsibility . . ... becoming a professional warrior.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: R. Kolar
Department of
Aeronautics

SURVIVABILITY CONSIDERATIONS DURING AIRCRAFT CONCEPTUAL DESIGN

Robert John Gilman
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

Survivability, capability, maintainability, and reliability will establish the effectiveness of a combat aircraft. Considerations for the "ilities" must take place during the conceptual design phase. Retrofit of survivability enhancement has historically increased weight, drag, and cost, while decreasing capability and performance. Proper application of the six susceptibility reduction concepts and the six vulnerability reduction concepts must take place before the design is established to maximize effectiveness and minimize penalties. In this thesis, the application of survivability enhancement techniques to the conceptual design is presented in general and also specifically applied to the design of a long range Strike Fighter aircraft. General guidelines for susceptibility and vulnerability reduction for any aircraft are also presented.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: R.E. Ball
Department of
Aeronautics

INVESTIGATION OF A MACH 1.4 COMPRESSOR CASCADE WITH VARIABLE BACK PRESSURE USING FLOW VISUALIZATION

Michael George Hegland
Lieutenant Commander, United States Navy
B.S., Western Washington University, 1975

Flow through a transonic compressor cascade model was investigated at M = 1.4 using flow visualization and pressure measurements. Shock patterns for two different blade incidences were documented at increasing back pressures. Data were taken up to a maximum pressure ratio of 1.53 at estimated minimum loss incidence conditions. An oblique shock system persisted, producing large flow turning (6.8°) and a slightly supersonic exit mach number (1.02). Losses and blade pressure loading were calculated using a combination of test data and computational approximations. Failure of blade retaining tabs occurred with both aluminum and steel cascade blades. Failures were attributed to fatigue from high oscillatory stress levels and redesigned blade mounts were proposed.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: R.P. Shreeve
Department of
Aeronautics

STATE-SPACE ANALYSIS OF THE TRIDENT II MARK 6 GYRO

David L. Krouger
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

This thesis conducts a state-space analysis of the Mark 6 gyro used in the Trident II missile system. Optimal control techniques, utilizing a region controller, have been employed in designing a gyro controller. The response of the system to missile motion is examined and compared to the system response using the current control laws. It is shown that an optimal region controller reduces the gyro error in the system while effectively avoiding gimbal lock, a situation which exists when gyro orientation prevents missile motion from being isolated in an orthogonal three axis coordinate system. Recommendations for the application of additional modern control techniques are included.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: D.J. Collins
Department of
Aeronautics

AUTOMATED AIRCRAFT STATIC STRUCTURAL TESTING WITH COMPUTER AIDED INTERPRETATION

James John Miller
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

The objective of this study is to improve three primary aspects of static structural testing at the Naval Postgraduate School. First, computer controlled digital multimeters simultaneously display twelve data locations on the structure while the test is in progress. Second, immediate interaction is permitted. If some unexpected data occurs during the testing, the test plan can be modified to focus in on any area of interest. Third, the operator is presented with two different real-time visual interpretations of the strain gage data reduced to the strain tensor components with animated deformations.

These objectives contribute to enhancing the real-time correlation between input load and output structural response in terms of direct physical measurements rather than indirect abstract tensor components.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: E.M. Wu
Department of
Aeronautics

A CASE STUDY OF A COMBAT AIRCRAFT'S SINGLE HIT VULNERABILITY

Robert Edwin Novak, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

This thesis presents the methodology for a detailed vulnerability assessment of a generic aircraft in the conceptual/preliminary design stage. The single hit vulnerability of the aircraft to a 100 grain fragment is determined using the textbook, The Fundamentals of Aircraft Combat Survivability Analysis and Design. The intent of this work is to provide a realistic case study of a vulnerability assessment that can be used by others as a learning tool.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: R.E. Ball
Department of
Aeronautics

DEVELOPMENT OF FLIGHT PERFORMANCE ALGORITHMS AND A TACTICAL COMPUTER AIDED MISSION PLANNING SYSTEM FOR THE A-7E AIRCRAFT

Christopher Glenn Nutter
Lieutenant, United States Navy
B.S., Purdue University, 1976
M.A., Webster College, 1980

This thesis presents a fully developed, tactically oriented computer aided mission planning system for the A-7E aircraft. The system is designed to be extremely easy to operate by someone with no computer experience, and is a replacement for 53 NATOPS performance charts that are most applicable to flight and mission planning. High altitude performance, as well as low altitude and maximum range performance, are available. Tactical navigation routes may be entered, edited, and saved in a disk file. Navigation computations are linked with aircraft performance to provide printout of a completed mission planning jet log.

Numerical techniques for obtaining analytical expressions from chart and tabular data included multiple linear regression analysis, curve fitting, and cross plotting of regression coefficients. The computer program results have been correlated with NATOPS data and actual flight test, and have been found to be highly accurate. The program is designed to be run on the IBM PC/XT/AT and compatible computers with a minimum of 256K memory available.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: D.M. Layton
Department of
Aeronautics

AN ANALYSIS OF THE PERFORMANCE OF THE FANS OF A WIND TUNNEL AT THE NAVAL POSTGRADUATE SCHOOL

Marcos Luis Pereira
Lieutenant Colonel, Brazilian Air Force
B.S., Mechanical Engineering, Instituto Tecnicologico da Aeronautica, São Paulo, Brasil

The large subsonic "academic" wind tunnel at NPS, powered by two counter-rotating fans, never achieved the design specifications. The reason for the poor performance of the tunnel was unknown but believed to be due to either poorly designed fan blades or to separation in the diffuser. Being easier to analyse, the fan blades were chosen for initial study.

The approach used is a new blade element method for calculating the performance of high and intermediate solidity fans. Although this new method predicts some deviations from the original isolated blade analysis, it was found that the design was adequate and, therefore, the tunnel problem is most probably due to separation in the diffuser.

Master of Science in Aeronautical Engineering
December 1985

Advisor: J.V. Healey
Department of Aeronautics

DEVELOPMENT OF A MATHEMATICAL MODEL THAT SIMULATES LONGITUDINAL, AND LATERAL-DIRECTIONAL RESPONSE OF THE F/A-18 FOR THE STUDY OF FLIGHT CONTROL RECONFIGURATION

Fredric W. Rojek
Lieutenant, United States Navy
B.S.E.E., State University of New York at Buffalo

A linearized mathematical model is developed which simulates the dynamic response of the Navy F/A-18 for the study of flight control reconfiguration. The aircraft is modeled as a multi-input multi-output, sampled data, closed system, which couples the dynamics of the flight control system to the aircraft linearized small perturbation equations. The discrete time, state variable equations for the system are then formulated. A computer program is developed which will compose the model matricies and compute the response of the aircraft to stick and rudder inputs.

To study flight control reconfiguration, the model allows individual actuation of either a left or right control surface. Aircraft response to the actuation loss of either the left or right stabilator is simulated in the program. The program is designed to implement the reconfigurable control mixer, currently under study for the Self-Repairing Digital Flight Control System.

The computer simulation was written in VS FORTRAN. A copy of the program and simulation results are included in the appendices.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: D.J. Collins
Department of
Aeronautics

HOLOGRAPHIC INVESTIGATION OF METALLIZED SOLID PROPELLANT COMBUSTION IN A THREE-DIMENSIONAL MOTOR

James Blake Rubin
Lieutenant, United States Navy
B.S., Purdue University, 1979

An experimental investigation was performed to determine the feasibility of obtaining particle size data using pulsed-ruby holography in a three-dimensional metallized solid propellant rocket motor. Holograms of a USAF Resolution Target and a LEOS dot target were taken under various conditions, with the system resolution determined to be under 5 microns. Good quality holograms were obtained at pressures of 91, 110, and 280 psi using an HTPB/ammonium perchlorate propellant with 2 percent, 20 micron aluminum. Holograms were not successful at a pressure of 240 psi and 560 psi with a 2 percent aluminized AP/GAP propellant. For this propellant, transmittance tests indicated complete opacity during the steady-state portion of the burn.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: D.W. Netzer
Department of
Aeronautics

REVIEW, IMPLEMENTATION AND TEST OF THE QAZ1D COMPUTATIONAL METHOD WITH A VIEW TO WAVE ROTOR APPLICATIONS

Thomas Francis Salacka
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

The QAZ1D method is redeveloped in detail and implemented in a first order, one-dimensional FORTRAN program, EULER-1. The program is tested on the shock tube problem and results are presented for various computational meshes and initial conditions. Based on good results of the EULER-1 code, recommendations are made for future extensions and testing to validate the suitability of the QAZ1D method for wave rotor applications.

Master of Science in
Aeronautical Engineering
December 1985

Advisor: R.P.Shreeve
Department of
Aeronautics

AN EXPERIMENTAL INVESTIGATION OF VARIOUS METALLIC/POLYMER FUELS IN A TWO-DIMENSIONAL SOLID FUEL RAMJET

Charles Kenneth Scott, II
Lieutenant, United States Navy
B.S., SUNY at Brockport, 1977

An experimental investigation was conducted of highly metallized (approximately 70% by weight) solid fuels burned in a two-dimensional solid fuel ramjet (SFRJ). High speed motion pictures were taken of the combustion process through viewing windows located at two locations along the fuel slab length. Films revealed various ejection events ranging from small particle ejections to large flakes of burning and non-burning material leaving the surface. Nine different fuels were tested at air mass fluxes of 0.2 and 0.5 pounds mass per inch squared per second and pressures ranging from 35 to 200 psia. There was evidence that both minor binder ingredient changes (polymer and curative) and the inclusion of magnesium resulted in larger required inlet step heights to sustain combustion. Most of the metallized fuels did not burn well at pressures below approximately 40 psia. Low air mass fluxes generally resulted in larger metallic surface agglomerations, larger particles in the gas phase and more dominate shedding of surface layers.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: D.W. Netzer
Department of
Aeronautics

A COMPUTER AIDED METHOD FOR THE MEASUREMENT OF FIBER DIAMETERS BY LASER DIFFRACTION

Mark Gerald Storch
Lieutenant, United States Navy
B.S., Miami University, 1979

This thesis investigates the computer aided measurement of fiber diameters by laser diffraction. The proposed system consists of a light sensitive Random Access Memory (RAM) chip which collects light intensity data from the laser diffraction pattern. Measurements of the spatial location of the nodes of the diffraction pattern enables the calculation of the fiber diameter. These measurements may be performed manually which is tedious and requires subjective judgement of the nodes. The alternative method of direct processing of the intensity pattern was investigated. Simulation is conducted to examine the feasibility of this method. Results show such a system to be capable of providing one order of magnitude greater accuracy than optical microscopy measurements (with a shearing eyepiece) and double the accuracy of manual laser diffraction methods with the added advantage of permitting the option of total computer automation in data interpretation.

Master of Science in
Aeronautical Engineering
September 1986

Advisor: E.M. Wu
Department of
Aeronautics

COMPOSITE STRUCTURAL RELIABILITY CALCULATION BY FINITE ELEMENT AND STATISTICAL STRENGTH THEORY

Pattama Suttisornyotin
Lieutenant, Royal Thai Air Force
B.S., Royal Thai Air Force Academy, 1979

The reliability of the structure can be calculated by combining the non-uniform stress distribution of a structure from finite element analysis with the statistical strength theory under two dimensional non-homogeneous, uniaxial stress limitations. The specimen models with and without notch are the sample structures to illustrate the calculations. The statistical strength of the structure is cast in the standard Weibull form characterized by the structural scale parameter, β_E and shape parameter, α_E which are functions of the material scale and shape parameters (α and β). Therefore, this thesis demonstrates that the scale parameter of structure remains constant for different load magnitude, only the structural geometry and loading condition cause the change of material scale parameter, β to the structural scale parameter, β_E . The results also shows that the degree of uniformity of stress within structural element and the linearity of load magnitude and stress distribution within the structure affect the accuracy for the calculation.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: E.M. Wu
Department of
Aeronautics

DESIGN OF A VERTICAL THRUST TEST STAND FOR A REMOTELY PILOTED MODEL HELICOPTER

Theodore J. Urda
Lieutenant, United States Navy
B.S., Illinois Institute of Technology, 1978

This paper discusses the necessary functional characteristics for the design of a test stand to measure the vertical thrust of a remotely piloted model helicopter as a function of power output, in different degrees of ground effect. A number of potential design choices are presented along with possible instrumentation schemes to obtain both the power output and the lifting force generated by the Heli-Star model helicopter equipped with a Gold Cup HP.61 engine. Included are the results of preliminary validation testing of the test stand design chosen and a discussion of the methods used to eliminate or control vibrations which hampered the utility of the test stand. Recommendations for possible future modifications are also included.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: D.M. Layton
Department of
Aeronautics

A TRADE-OFF STUDY OF TILT ROTOR AIRCRAFT VERSUS HELICOPTERS USING VASCOMP II AND HESCOMP

Thomas P. Walsh
Captain, United States Army
B.S., Norwich University, 1976

Trade-off studies were conducted wherein two versions of tilt rotor aircraft were examined to determine optimum mission distances where the tilt rotor designs were superior to a comparable contemporary (pure) helicopter. Two FORTRAN computer programs (VASCOMP II and HESCOMP) developed under contract for NASA Ames Research Center by the Boeing VERTOL Company were used to predict aircraft performance. Program results were validated using data from independent sources. A simplified user's manual is included (with sample data and program output) for VASCOMP II use at the Naval Postgraduate School, Monterey, California.

Master of Science in
Aeronautical Engineering
March 1986

Advisor: M.F. Platzer
Department of
Aeronautics

EXPERIMENTAL INVESTIGATION OF A THRUST AUGMENTING EJECTOR

Hidayat Wiradimadja
Major, Indonesia Air Force
B.S., Indonesia Air Force Academy, 1969

The present investigation concerns the performance of a two-dimensional ejector with its primary jet excited by a novel method. A constant area duct was used in this experiment. The velocity of the jet at the exit was subsonic. Maximum thrust was obtained when the ejector to jet exit area ratio was about 35. Under this condition a thrust augmentation ratio of 1.65 was achieved, with the jet excited at 20 Hz, whereas without excitation it was only 1.40. The mixing characteristics of the jet under excitation was examined using flow visualization techniques. Smoke filaments illuminated by a sheet of powerful light and schlieren optics with the jet heated were used for the above purpose. Excitation of the jet was found to generate large vortex-like flow structures which might be responsible for enhanced mixing. These vortices extended to considerable distances on both sides of the jet.

Master of Science in
Aeronautical Engineering
December 1985

Advisors: M.F. Platzer
M.A. Badri Narayanan
Department of
Aeronautics

MASTER OF SCIENCE

IN

APPLIED MATHEMATICS

COVERING THE DE BRUIJN GRAPH

Roy Dale Bryant
Captain, United States Marine Corps
B.S., Kansas State College of Pittsburg, 1976

Random-like sequences of 0's and 1's are generated efficiently by binary shift registers. The output of n-stage shift registers viewed as a sequence of binary n-tuples also give rise to a special graph called the de Bruijn graph B_n. The de Bruijn graph is a directed graph with 2^n nodes. Each node has 2 arcs entering it and 2 arcs going out of it. Thus, there are a total of 2^{n+1} arcs in B^n.

In this thesis, we define a cover of the de Bruijn graph, different from the usual graph theoretic cover. A cover S of the de Bruijn graph is defined as an independent subset of the nodes of B_n that satisfy the following property. For each node x in B_n - S, there exists a node y in S such that either the arc $\langle x,y \rangle$ or the arc $\langle y,x \rangle$ is in B_n.

Combinatorially, we are able to place both upper and lower bounds on the cardinality of S. We find examples of covers that approach these bounds in cardinality. Several algorithms are presented that produce either a maximal or a minimal cover. Among them are Frugal, Sequential Fill, Double and Redouble, Greedy and Quartering.

Master of Science in
Applied Mathematics
March 1986

Advisor: H. Fredricksen
Department of
Matematics

KNOT SELECTION FOR LEAST SQUARES APPROXIMATION USING THIN PLATE SPLINES

John R. McMahon
Captain, United States Army
B.S., Syracuse University, 1977

Given a large set of scattered data (xi,yi,fi), a method for selecting a significantly smaller set of knot points which will represent the larger set is described, leading to a package of FORTRAN subroutines. The selection of the knot point locations is based on the minimization of the sum of the squares of the difference between the average number of points per Dirichlet tile and the actual number of points in each tile, subject to the constraint that each knot is located at the centroid of its tile. The pertinent theoretical and computational aspects of the subroutines are introduced and described in detail. Using the least squares thin plate spline approximation method for constructing surfaces, various test surfaces are examined and compared to surfaces obtained using smoothing splines and the bicubic Hermite approximation method. The FORTRAN subroutines are made available to prospective users through a point of contact.

Master of Science in
Applied Mathematics
June 1986

Advisor: R. Franke
Department of
Mathematics

MASTER OF SCIENCE

IN

APPLIED SCIENCES

A MATHEMATICAL MODEL FOR CALCULATING NON-DETECTION PROBABILITY OF A RANDOM TOUR TARGET

Salah Ibrahim Abd El-Fadeel
Colonel Engineer, Egyptian Army
B.S.C., Faculty of Engineering, Cairo University, 1968

The primary objective of this study was to build a mathematical model to predict the probability of a target moving according to a two-dimensional random tour model avoiding detection (i.e., surviving) to some specified time, t.

This model assumes that there is a stationary searcher having a "cookie-cutter" sensor located in the center of the search area.

A Monte-Carlo simulation program was used to generate the non-detection probabilities. The output of this program was used to construct the required mathematical model.

The model predicts, and simulation supports that as the mean segment length of the random tour becomes small with respect to the square root of the area size, the probability of non-detection approaches that previously obtained for a diffusing target. In the opposite extreme, the probability of non-detection approaches the general form of Koopman's random search formula.

Master of Science in
Applied Sciences
December 1985

Advisor: J.N. Eagle
Department of
Operations Research

FUTURE REQUIREMENTS OF THE NAVY/NOAA OCEANOGRAPHIC DATA DISTRIBUTION SYSTEM

Paul Michael Duernberger
Commander, NOAA Corps, U.S. Department of Commerce
B.S., New York Maritime Academy, 1968

The Navy/NOAA Oceanographic Data Distribution System (NODDS) is described and its history is traced from the system's inception in 1979. NODDS allows both government and commercial users to access unclassified oceanographic and meteorological data and/or products from the Fleet Numerical Oceanography Center (FNOC). The available data and products are reviewed. The system is currently based on a PDP 11 computer which acquires FNOC products and data from the FNOC mainframe computers. The users access their directories through the TYMNET communications network. At the present time, the system has more than 40 users. Various system expansion issues are reviewed and various options for expansion are discussed. A three to five year expansion option is recommended.

Master of Science in
Applied Sciences
March 1986

Advisor: N. Schneidewind
Department of
Administrative Sciences

CART PROGRAM: THE IMPLEMENTATION OF THE CART PROGRAM AND ITS APPLICATION TO ESTIMATING ATTRITION RATES

Amin Elseramegy Hamdy
Colonel, Egyptian Air Force
B.S.C., Military Technical College, 1971

The main purpose of this paper is the implementation of the classification and regression trees (CART) programs on the NPS Computer System. An additional goal is the forecasting of officer attrition rates for the highly cross-classified manpower structure of the U.S. Marine Corps. The use of this program requires a deep understanding of the algorithmic structure of CART and the user must experiment with it in order to develop a reasonable approach to the management of the computer's memory. The complete set of commands required to run the programs, and the complete results, are included.

Master of Science in
Applied Sciences
December 1985

Advisor: R.R. Read
Department of
Operations Research

MASTER OF SCIENCE

IN

COMPUTER SCIENCE

DESIGN OF A GRAPHICS USER INTERFACE FOR A DATABASE MANAGEMENT SYSTEM

Jerry K. Adcock
Lieutenant, United States Navy
B.S.E., Purdue University, 1978

This thesis presents a solution to the problems associated with database management systems. User needs are discussed, with a methodology to meet those needs. It is shown that no current system exists which can satisfy all requirements, so a new system or interface must emerge.

The remainder of the thesis presents the design of such a system, called Graphics Language for Accessing a Database (GLAD). The Hierarchical Input Process Output (HIPO) system is used for design representation.

Master of Science in
Computer Science
June 1986

Advisor: C.T. Wu
Department of
Computer Science

LEXICAL TRANSLATOR FROM ARABIC TO LATIN IN PASCAL ENVIRONMENT

Sadek Saleh Aljuhaiman
Captain, Royal Saudi Air Defense Forces
B.S., Arizona State University, 1979

The Lexical translator is a program written in Turbo PASCAL to generate a Latin PASCAL source code from an Arabic PASCAL source code. The Arabic code is written under a bilingual operating system transparent to the DOS on personal computers.

The bilingual operating system compatibility as well as the Arabic characters' code values is investigated. The Latin code is fed into a computer to be compiled and run with a Latin interpreter (i.e., Turbo PASCAL), in an Arabic environment.

Master of Science in
Computer Science
September 1986

Advisor: D. Davis
Department of
Computer Science

CONTROL AND MANAGEMENT OF THE SOFTWARE MAINTENANCE CHANGES PROCESS

Nasser A. Al-Subaiei
Captain, Royal Saudi Arabia Air Defense Forces
B.S.E.E., Arizona State University, 1978

The cost of software maintenance is very high and projected to climb higher in the future. Failure to adopt and utilize improved technical and management methods and tools contributes to the high cost and burden of maintenance. Software configuration management as an effective technique of controlling software development/maintenance is examined. Two change control models are identified and evaluated as to their effectiveness and completeness toward achieving efficient control and easing maintenance effort. A proposed change control model which addresses more aspects and promises better results through a set of guidelines for an "ideal" software maintenance change control is presented. Software maintenance change control tools are discussed by identifying two of the existing tools. With proper implementation of the proposed change control model and the use of an effective change control tool, better control of the maintenance process can be achieved, and the maintenance effort reduced.

Master of Science in
Computer Science
June 1986

Advisor: G.H. Bradley
Department of
Computer Science

USER INTERFACE DESIGN FOR TWO DIMENSIONAL POLYGONALLY ENCODED GEOLOGICAL SURVEY MAPS

Joann Marie Ammann
Lieutenant, United States Navy
B.A. Rutgers University, 1980

This study presents an overview of a cartographic processing pipeline for the generation and maintenance of polygonally encoded data bases from published U.S. Geological Survey maps. The focus of this research centers on the development of an interactive editing system. The editor, serving as the final step in the overall project, provides the user with the capability to correct and modify dated topographic characteristics. A variety of processing and digitizer induced errors introduced into the data base from previous utility steps can also be corrected. Included is a discussion on the internal indexing scheme used for managing revisions and the techniques and algorithms for updating the data bases.

Master of Science in
Computer Science
June 1986

Advisor: M.J. Zyda
Department of
Computer Science

IMPLEMENTATION OF A PERSONNEL DATABASE SYSTEM FOR CREW ALLOCATION AND REPORTS PRODUCTION IN A SMALL BATTLESHIP'S ENVIRONMENT

Constantinos Anastasatos
Lieutenant, Hellenic Navy
B.A., Hellenic Naval Academy, 1974

Crucial to the Naval mission, but administrative in nature, is the assignment of ship's company to temporary and permanent duty assignments. This study implements a personnel database system for personnel management on a small battleship. dBASE III is used as a "Database Management Software" and the "System" is implemented as a collection of algorithms providing intelligent decisions about these assignments. It can be supported by an IBM PC/XT (or an IBM PC/XT compatible) microcomputer.

The system is designed to provide real time management decision information on crew allocations, as well as required periodic reports, based on current crewmember information.

Master of Science in
Computer Science
June 1986

Advisor: G.S. Baker
Department of
Computer Science

THE IMPLEMENTATION OF AN ENTITY-RELATIONSHIP INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM

Jacob A. Anthony, III
Lieutenant, United States Navy
B.S., Pennsylvania State University

Alfred J. Billings
Lieutenant, United States Navy
B.S., University of Utah, 1977

Traditionally, the design and implementation of a conventional database system begins with the choice of a data model followed by the specification of a model-based data language. Thus, the database system is restricted to a single data model and a specific data language. An alternative to this traditional approach to database-system development is the multi-lingual database system (MLDS). This alternative approach enables the user to access and manage a large collection of databases via several data models and their corresponding data languages without the aforementioned restriction.

In this thesis we present the implementation of an entity-relationship/Daplex language interface for the MLDS. Specifically, we present the implementation of an interface which translates Daplex language calls into attribute-based data language (ABDL) requests. We describe the software engineering aspects of our implementation and an overview of the five modules which comprise our entity relationship/Daplex language interface.

Master of Science in
Computer Science
March 1986 (Anthony)
December 1985 (Billings)

Advisor: D.K. Hsiao
Department of
Computer Science

NON-ROMAN FONT GENERATION VIA INTERACTIVE COMPUTER GRAPHICS

Jane Claude Artero
Lieutenant, United States Navy
A.B., University of California, Berkeley, 1975

This study examines the characteristics of computer symbol manipulation systems, including the conventions governing conversion of input symbols to internal code and back to output symbols. Methods to achieve flexibility in the manipulation of large, non-standard, and non-Roman-character symbol sets are discussed, primarily by examination of word processing systems designed to operate on non-Roman fonts. The intent of this discussion is to highlight the desirability of moving toward a computer design approach which incorporates generalized symbol management capabilities. "Leading-edge" computer graphics systems are then evaluated for their potential to host advanced font management systems resulting from this innovative design approach. Finally, the BUILDFONT Font Creation and Editing System, a software utility implemented on the IRIS-2400 series Graphics Workstation, is presented as a tool to assist researchers to develop generalized symbol management applications.

Master of Science in
Computer Science
June 1986

Advisor: M.J. Zyda
Department of
Computer Science

IMPLEMENTATION OF A MATERIAL DATABASE SYSTEM IN HELLENIC ARMED FORCES FORMATIONS

Panagiotis A. Bozikas
Lieutenant Colonel, Greek Army
B.S., Greek Army Military Academy, 1966

This thesis contains an implementation of a material database system for the Hellenic Armed Forces. The Hellenic Armed Forces Formations currently manage all material data manually. The author proposes the switching from manual processing to automated processing in an Ordnance Battalion of an Infantry Division using dBASE II with an IBM personal computer. Particular emphasis is placed on:

1. The reasons and the system tasks.
2. The conversion of the old manual system to an automated system.
3. The implementation of the design.

Master of Science in
Computer Science
June 1986

Advisor: L. Rawlinson
Department of
Computer Science

THE FEASIBILITY OF AUTOMATIC STORAGE RECLAMATION WITH CONCURRENT PROGRAM EXECUTION IN A LISP ENVIRONMENT

Kevin G. Cassidy
Lieutenant Commandor, United States Navy
B.S., U.S. Naval Academy, 1972

In "classical" LISP implementations, program execution/computation continues until there is no more memory available (i.e. the free list of available cells has become exhausted). When this happens, user program(s) HALT and then storage reclamation, in the form of garbage collection, takes over. This halting of programs in the midst of their computation is not only frustrating to programmers and researchers but can also be of crucial importance in other applications. This paper investigates the feasibility of allowing concurrent program execution with garbage collection. Proof of correctness and performance issues are not discussed. Neither allocation of memory techniques/procedures nor garbage collection in virtual memory systems are thoroughly discussed. These issues are thoroughly described in the listed references. LISP has been selected because it has been estimated that typical LISP programs take 10%-30% of their processing time to perform garbage collection.

Master of Science in
Computer Science
December 1985

Advisor: B.J. MacLennan
Department of
Computer Science

PRINTER MULTIPLEXING AMONG MULTIPLE Z-100 MICROCOMPUTERS

Kwang Jun Choi
Captain, Korean Army
B.S., Korean Military Academy, 1978

Ju Kab Lee
Captain, Korean Army
B.S., Korean Military Academy, 1979

This thesis describes the detailed design and implementation of a printer server in the laboratory environment of sharing resources among multiple Zenith Z-100 microcomputers. The Printer Server System is a controller box which consists of a power supply, a single board computer, and the BLC 8539 eight channel I/O expansion boards. Each Z-100 microcomputer is connected to the controller through the RS-232C port.

The Printer Server System has three software utilities: BOOT, CONTROL, and SPOOL. The BOOT process, resident in the controller, downloads the CONTROL file from any one of multiple Z-100's which is turned on. The CONTROL process allows the printer to be used by any one of multiple Z-100's at a time. The SPOOL process sends the data thru the CONTROL process to the printer or saves the data on the disk file.

Master of Science in
Computer Science
December 1985

Advisor: U.R. Kodres
Department of
Computer Science

TACTICAL DISPLAY SIMULATOR FOR THE H/Z-100

Ken Coomes
Lieutenant, United States Navy
B.S.E.E., University of Washington, 1978

This thesis explores the feasibility of developing a tactical display simulator on the H/Z-100 microcomputer. A prototype simulator is implemented in ZBASIC, some graphics functions routines are implemented in Macro-86, and timing and performance measurements are performed for comparison.

Listings of the code of the programs developed are presented, as well as instructions for their effective use. Directions for the modification of the code, and suggested profitable areas of exploration and further development are included.

It is concluded that a tactical display simulator is feasible, and that the final implementation should be in Macro-86.

Master of Science in
Computer Science
March 1986

Advisor: U.R. Kodres
Department of
Computer Science

RELATIONAL MODEL OF A DATA DICTIONARY

M. Gokhan Dedeoglu
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979
B.S., Technical University of Istanbul, 1983

The data dictionary system is an important tool for supporting information resource management. It facilitates the management and control of data.

This thesis will develop a relational model of a data dictionary and implement it on the ORACLE relational data base management system. Then, this data dictionary model will be implemented using the logic-oriented Prolog language. The Prolog model of a data dictionary will demonstrate that logic programming can be used for relational data base applications and that it provides more powerful dictionary capabilities than the relational model.

Master of Science in
Computer Science
December 1985

Advisor: D.R. Dolk
Department of
Administrative Sciences

TWO-DIMENSIONAL POLYGONAL REPRESENTATION OF MAPS FOR USE WITH AUTONOMOUS VEHICLE ROUTE PLANNING

Roger Keith Diehl
Captain, United States Marine Corps
B.S., University of Missouri-Columbia, 1977

This study presents a two-phase approach to the generation and maintenance of a polygonal cartographic database to be used with autonomous vehicle route planning. The database is non-interactively generated from available U.S. Geological Survey topographical maps, and interactively maintained. The focus of this research centers on the non-interactive generation of the polygonal database through heuristic processing of digital images and subsequent region growing.

Master of Science in
Computer Science
June 1986

Advisor: M.J. Zyda
Department of
Computer Science

THE IMPLEMENTATION OF A NETWORK CODASYL-DML INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM

Bulent Emdi
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1978

Traditionally, the design and implementation of a conventional database system begins with the selection of a data model, followed by the specification of a model-based data language. An alternative to this traditional approach to database system development is the multi-lingual database system (MLDS). This alternative approach affords the user the ability to access and manage a large collection of databases via several data models and their corresponding data languages.

In this thesis we present the specification and implementation of a network CODASYL-DML language interface for the MLDS. Specifically, we present the specification and implementation of an interface which translates CODASYLDML data language calls into attribute-based data language (ABDL) requests. We describe the software engineering aspects of our implementation and an overview of the four modules which comprise our CODASYL-DML language interface.

Master of Science in
Computer Science
December 1985

Advisor: D.K. Hsiao
Department of
Computer Science

A COMPUTER AIDED DESIGN FOR THE GENERATION OF TEST TRANSACTIONS AND TEST DATABASES AND FOR THE BENCHMARKING OF PARALLEL, MULTIPLE BACKEND DATABASE SYSTEMS

George P. Fenton
Major, United States Marine Corps
B.S., United States Military Academy, 1974
M.A., Central Michigan University, 1980

The multi-backend database system (MBDS) is a research effort conducted jointly by the Naval Postgraduate School and Ohio State University with the sponsorship of the STARS foundation. The MBDS is designed to overcome the capacity growth and performance gain problems of the traditional database systems and the single-backend database systems.

To verify the aforementioned capacity growth and performance claims, a benchmarking methodology has been formulated in the Naval Postgraduate School thesis, "A Performance Measurement Methodology for Software Multiple-Backend Database Systems" by James R. Vincent. This thesis presents the implementation of the methodology in the form of a computer-aided design (CAD) system for the generation of test databases and test-transaction mixes for benchmarking MBDS.

Master of Science in
Computer Science
June 1986

Advisor: D.K. Hsiao
Department of
Computer Science

MODERN HARDWARE TECHNOLOGIES AND SOFTWARE TECHNIQUES FOR ONLINE DATABASE STORAGE AND ACCESS

Christopher V. Feudo
Major, United States Army
B.S., United States Military Academy, 1972

Computerized data processing applications have grown over the past thirty years to a point where they have now become a pervasive influence in our society.

As the range of applications has grown, a continuing concern has been the cost and access time of data storage. A wide range of technologies have been investigated to address this problem. The purpose of th.s thesis is to examine high-volume, on-line storage media of current and emerging technologies and software techniques for supporting these on-line, high-capacity storage media. In the first part, we analyze such media as vertical magnetic recording, thin film media, optical data disks, magneto-optic disks, bubble and Bernoulli-effect disks. Then, comparisons and evaluations of products and product categories are illustrated. In the second part, we review the modern software techniques for on-line database storage and access.

Master of Science in
Computer Science
December 1985

Advisor: D.K. Hsiao
Department of
Computer Science

THE FRACTAL GEOMETRY OF NATURE: ITS MATHEMATICAL BASIS AND APPLICATION TO COMPUTER GRAPHICS

Michael Edward Gaddis
Captain, United States Marine Corps
B.S.B.A., University of Florida, 1978

Fractal Geometry is a recent synthesis of old mathematical constructs. It was first popularized by complex renderings of terrain on a computer graphics medium. Fractal geometry has since spawned research in many diverse scientific disciplines. Its rapid acceptance has been achieved due to its ability to model phenomena that defy discrete computation due to roughness and discontinuities. With its quick acceptance has come problems. Fractal geometry is a misunderstood idea that is quickly becoming buried under grandiose terminology that serves no purpose. Its essence is induction using simple geometric constructs to transform initiating objects. The fractal objects that we create with this process often resemble natural phenomena. The purpose of this work is to present fractal geometry to the graphics programmer as a simple workable technique. We hope to demystify the concepts of fractal geometry and make it available to all who are interested.

Master of Science in
Computer Science
December 1985

Advisor: M.J. Zyda
Department of
Computer Science

THE DESIGN AND ANALYSIS OF A COMPLETE ENTITY-RELATIONSHIP INTERFACE FOR THE MULTI-BACKEND DATABASE SYSTEM

Philip L. Goisman
Major, United States Army
B.A., Temple University, 1967

Interest in increasing programmer productivity has spawned new software tools. Some of these tools are statistical packages, program generators, and database management systems (DBMS). In the area of DBMS, research is ongoing to improve the efficiency of DBMS tools. One research effort to improve the efficiency of DBMS is the multi-lingual database system (MLDS). MLDS combines software and hardware technology to gain efficiency and versatility in DBMS. The MLDS design goals overcome the conventional limitation to develop a database system that supports a single data model and a corresponding model-based data language. Examples of data models are relational, hierarchical, network, and entity-relationship. Examples of corresponding model-based data languages are SQL, DL/I, CODASYL, and Daplex. These models and their data languages are supported conventionally by separate DBMS. Instead, MLDS as a single DBMS is capable of supporting multiple models and their respective database languages.

In this thesis we present a methodology for supporting entity-relationship database management on an attribute-based database system, since the heart of MLDS is the attribute-based system. Specifically, we provide the design specifications for transforming Daplex requests into equivalent attribute-based data language requests. During this design process, we describe the data structures, control structures, and the functions required to implement this transformation.

Master of Science in
Computer Science
December 1985

Advisor: D.K. Hsiao
Department of
Computer Science

PROCESS SYNCHRONIZATION AND DATA COMMUNICATION BETWEEN PROCESSES IN REAL TIME LOCAL AREA NETWORKS

Reinhard Haeger
Lieutenant Commander, Federal German Navy

This thesis extends the multi-computer real-time executive, MCORTEX. The multiple cluster system RTC* (Real Time Cluster Star), consisting of clusters of single board computers (INTEL iSBC 86/12A), which are connected via an Ethernet Local Area Network, serves as a hardware basis for the implementation of extended MCORTEX.

The extension upgrades MCORTEX to system-wide synchronization and general data communication between any processes in the system. An intercluster shared memory model is developed, that partially replicates intracluster shared memory, such that shared data replication is minimized and the system's processing speed is maximized.

This implementation, by transmitting produced shared data to all consuming clusters as soon as possible after production, guarantees that only cluster local hits occur in the system. Shared memory space is used efficiently by transmitting shared data to consuming clusters only, and by the ability to store shared data contiguously in intracluster shared memory.

Master of Science in
Computer Science
December 1985

Advisor: U.R. Kodres
Department of
Computer Science

TOP-DOWN PARSING SYNTAX ERROR RECOVERY

Paul Evan Hallowell, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Compiler writers continue to search for a reliable method of syntactic error recovery. Spurious error reports and confusing diagnostics are common problems confronting the programmer. Innumerable error possibilities have made recovery design a frustrating task.

This thesis implements a method of syntactic error recovery using recursive calls on the error recovery routine. Parsing is accomplished by traversing transition diagrams which are created from syntax charts. Key language symbols and dynamically generated recovery positions are used in restoring the parse. High quality error diagnostics give a clear, accurate, and thorough description of each error, providing an excellent instructional software tool. Approach and implementation issues are discussed, and sample output listings are included.

Master of Science in
Computer Science
December 1985

Advisor: R.W. Floyd
Department of
Computer Science,
Stanford University

ENTITY-RELATIONSHIP MODEL VS. EXTENDED SEMANTIC HIERARCHAL MODEL FOR CONCEPTUAL MODELING

Darrel L. Handgraaf
Captain, United States Marine Corps
B.S., Purdue University, 1979

This thesis investigates the area of conceptual data modeling and looks for a model to serve as a vehicle for designing improved semantic modeling capabilities. Several possible models are discussed but the Entity-Relationship model and the the Extended Semantic Hierarchal Model receive special emphasis. Comparisons will be made of their advantages and disadvantages regarding their suitability for conceptual modeling. The Entity-Relationship Model is chosen as being most capable of supporting enhanced conceptual modeling techniques. Support for this position along with recommended enhancements to the Entity-Relationship Model and a suggestion for an automated graphical design tool to improve its conceptual modeling capabilities are provided in the final chapter.

Master of Science in
Computer Science
June 1986

Advisor: C.T. Wu
Department of
Computer Science

JANUS/ADA IMPLEMENTATION OF A STAR CLUSTER NETWORK OF PERSONAL COMPUTERS WITH INTERFACE TO AN ETHERNET LAN ALLOWING ACCESS TO DDN RESOURCES

Robert L. Hartman
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Alec F. Yasinsac
Captain, United States Marine Corps
B.S., Appalachian State University, 1979

This thesis demonstrates the viability of implementing a local area network connecting a star cluster of Z-100 personal computers to an ETHERNET local area network and allowing access to a wide area network, ARPANET, through a host on ETHERNET, the VAX 11-780 minicomputer operating under UNIX. The system allows local file and message transfer in port-to-port and broadcast mode between Z-100's on the star network and remote login and file transfer to computers that are hosts on ETHERNET or are accessible through ARPANET. The microcomputers in the cluster can share expensive resources such as laser printers, the Gemini multi-level secure system, the ETHERNET medium, and the network control processor.

Components of the system are programmed in the Janus/Ada programming language for both the Z-100 microcomputers and the Intel 86/12A single board computer.

Master of Science in
Computer Science
June 1986

Advisor: U.K. Kodres
Department of
Computer Science

SURFACE CONSTRUCTION FROM PLANAR CONTOURS

Patrick Gerard Hogan
Lieutenant Commander, United States Navy
B.S., Jacksonville University, 1977

Many scientific and technical endeavors require the reconstruction of a three-dimensional solid from a collection of two-dimensional contours. One method for this reconstruction involves a procedure whereby individual pairs of contours are mapped together to form triangular surface patches. In this paper, we present an algorithm which not only handles mapping situations of simple, closed contours but also mappings of multiple contours per plane and partial contour mappings. Also included is a discussion of algorithm limitations and heuristics.

Master of Science in
Computer Science
December 1985

Advisor: M.J. Zyda
Department of
Computer Science

THE IMPLEMENTATION OF A MULTI-LINGUAL DATABASE SYSTEM-- MULTI-BACKEND DATABASE SYSTEM INTERFACE

Steven Todd Holste
Captain, United States Marine Corps
B.S., University of Washington, 1976
M.B.A., University of Washington, 1981

The limitations of the traditional Database Management System (DBMS) have become increasingly clear in recent years. Some of these limitations are interface inflexibility for user accesses, mono-lingual restriction in data languages, performance degradations over time, and excessive costs in upgrading.

Two complementary approaches to the DBMS design and implementation--the multi-lingual database system (MLDS) and the multi-backend database system (MBDS)--effectively deal with the limitations of the traditional DBMS approach. MLDS offers a multi-lingual capability to the DBMS environment, thus freeing the user from the limitations and inflexibility of the single-data-model-and-language approach. MBDS, by contrast, is designed to deal with the issues of performance degradation and upgrading costs by providing a parallel processing capability, and utilizing replicated software and identical hardware for expansion. System upgrades with MBDS have been shown to provide an essentially proportional performance gain-to-upgrade-cost ratio.

In this thesis, we present the implementation of an interface between MLDS and MBDS. Specifically, we present the procedures which create the Template and Descriptor Files in MLDS that are required by MBDS. Additionally, we describe the integration process tying these two systems together.

Master of Science in
Computer Science
June 1986

Advisor: D.K. Hsiao
Department of
Computer Science

IMPLEMENTATION OF GRAPHICAL LANGUAGE FOR ACCESSING DATABASE

Alparslan Horasan
Lieutenant, Turkish Air Force
B.S., Turkish Air War Academy, 1982

This thesis is a part of the implementation of a new graphics user interface for accessing a database proposed in paper [WU86]. As a result of this study, the data definition language of the proposed graphics user interface GLAD (Graphical Language for Accessing Database) has been implemented. This interface allows a user to create a database schema graphically. It is easy to learn and easy to use, in spite of conventional query languages. This thesis first discusses the general concepts of database and introduces the system that the implementation was achieved, then reviews the conventional query languages and previously proposed graphical user interfaces. After describing the major features of GLAD, the implementation is explained in detail. A listing of the program that achieves the interface is also provided.

Master of Science in
Computer Science
June 1986

Advisor: C.T. Wu
Department of
Computer Science

IMPLEMENTATION OF THE PRIMARY OPERATION, RETRIEVE-COMMON, OF THE MULTI-BACKEND DATABASE SYSTEM (MBDS)

Andrew L. Hunt
Captain, United States Army
B.S., Hofstra University

The multi-backend database system (MBDS) is a research effort conducted jointly by the Naval Postgraduate School and Ohio State University with the sponsorship of the STARS foundation. The MBDS is designed to overcome the capacity growth and performance gain problems of the traditional database systems and the single-backend database systems.

The original MBDS supported four primary operations - INSERT, RETRIEVE, DELETE, and UPDATE. This thesis presents the implementation of a fifth primary operation, RETRIEVE-COMMON. This operation is used to merge the records of two files which satisfy a particular query and share a common value for given attributes. The preliminary design is discussed in the Naval Postgraduate thesis "Design, Analysis and Implementation of the Primary Operation, Retrieve-Common, of the Multi-Backend Database System (MBDS)" by Hsiang-Lung Tung.

Master of Science in
Computer Science
June 1986

Advisor: D.K. Hsiao
Department of
Computer Science

FOURTH GENERATION PROGRAMMING LANGUAGES

Everett Lee Jacobson
Captain, United States Marine Corps
B.S., Washington State University, 1976

With an ever increasing demand for new program applications and the failure of older generations of languages, such as COBOL, PL/I, PASCAL, etc., to keep up with this increased demand, there exists a need for new techniques and approaches to programming. Greater programmer/user productivity and enhanced user friendliness, to allow more end users to develop applications on their own, are goals sought by industry in order to reduce skyrocketing backlogs of applications. This paper describes a new generation of programming languages, used in the development of business and scientific applications, that addresses and achieves these goals. The basic characteristics of Fourth Generation Languages is reviewed and the design and implementation of a Fourth Generation Language is proposed. Although Fourth Generation Languages do increase user productivity and are easier to learn and use than previous generations of languages, much research remains to be done before general end user computing becomes the norm rather than the exception.

Master of Science in
Computer Science
June 1986

Advisor: C.T. Wu
Department of
Computer Science

DESIGN GUIDELINES FOR A RULE-BASED PASSIVE SURVEILLANCE SYSTEM

Kirk Edward Jennings
Naval Ocean Systems Center
B.S., University of Hawaii, 1968
M.S., University of Hawaii, 1969

This paper addresses the application of artificial intelligence to passive surveillance systems that use waveform analysis as their primary means of detecting, classifying and locating a specific target. Discussion is further limited to those passive surveillance systems which must deal with considerable noise in the data.

Present methods, which use visual examination of the waveform data for the detection of target waveforms, is complicated, time consuming, and requires considerable expertise. The lack of prior knowledge of the nature of the noise, (e.g., frequency spectra, amplitude, or dynamics), means that the majority of signal analysis must be done by experts.

This study discusses and recommends a rule-based system which uses the following artificial intelligence structures: the blackboard architecture, and the frames data structure. Sources of uncertainty are also discussed and methods of dealing with it are suggested. This study recommends that the symbolic representation language be carefully selected for conciseness, efficiency, and a vocabulary rich enough to express everything desired by the experts. A learning knowledge source is also recommended.

Master of Science in
Computer Science
September 1985

Advisors: N.C. Rowe
Department of
Computer Science

C.R. Dunlap
Department of
Oceanography

SURFACE RECONSTRUCTION FROM PLANAR CONTOURS

Allan Roper Jones
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Many applications of computer graphics involve the representation of a three-dimensional solid reconstructed from a sequence of two-dimensional planar contours. Surface construction algorithms accomplish this by mapping individual pairs of contours, forming triangular surface patches, which approximate the original three-dimensional solid. In this paper, we present an expanded algorithm which not only handles the mappings of multiple contours per plane and partial contour mappings, but also allows human interaction to resolve mapping problems. We include a discussion of our algorithm's limitations and proposed solutions.

Master of Science in
Computer Science
June 1986

Advisor: M.J. Zyda
Department of
Computer Science

THE ENTITY-RELATIONSHIP APPROACH: A GOOD TOOL FOR TACTICAL DATA SYSTEMS?

Richard P. Kauffold
Lieutenant, United States Navy
B.S., University of Nebraska at Lincoln, 1977

The Entity-Relationship approach is investigated to determine its suitability for the construction of a logical database design for a tactical data system (TDS) to be used by surface ships in the U.S. Navy. Some motivation for the use of database techniques in the design of a TDS is given, and a schema design based on the Entity-Relationship approach is presented. This design includes Entity-Relationship diagrams in some detail for major entity and relationship sets for a TDS. An attempt to model behavior using Petri nets is described and several developed Petri nets are shown. It is concluded that the Entity-Relationship approach is workable for the task of building a TDS logical database design and that the resulting design is expressive and flexible. It is also argued that the simplicity of the Entity-Relationship model makes design validation by real-world domain experts easier.

Master of Science in
Computer Science
June 1986

Advisor: C.T. Wu
Department of
Computer Science

EVALUATION OF THE TOOLPACK FORTRAN PROGRAMMING ENVIRONMENT

June Sik Kim
Lieutenant, Republic of Korea Navy
B.S., Korean Naval Academy, Jin Hae, Korea, 1979
B.S., Inha University, Inchon, Korea, 1983

TOOLPACK is a programming environment for the development of medium-sized Fortran programs by scientists, engineers and mathematicians. TOOLPACK was developed by a confederation of computer scientists at several government labs and universities in the United States and Great Britain; it was first released in 1985. This thesis is an evaluation of TOOLPACK. It includes a discussion of the installation on the VAX/VMS, benchmarks of tool performance, and a comparison of the users' needs, TOOLPACK goals and TOOLPACK capabilities.

Master of Science in
Computer Science
June 1986

Advisor: G.H. Bradley
Department of
Computer Science

THE USE OF DBASE II AND MICROCOMPUTERS

Haralabos P. Kondylopoulos
Major, Hellenic Air Force
B.S., Hellenic Air Academy, 1973

The Hellenic Air Force storage/utilization database management system (DBMS), utilizes mainframe computers. It is a system for large applications, such as big business, and it is used only at the Air Force Headquarters Level. However, the need for an extension of this system, to lower levels, has been recognized for a long time.

This problem can be resolved through the implementation of the DBMS programs developed for this thesis, and the utilization of DBASE II software applied to microcomputers, vice the larger, more expensive, mainframe computers.

Master of Science in
Computer Science
December 1985

Advisor: L.C. Rawlinson
Department of
Computer Science

A SYSTEM FOR KOREAN CHARACTER USAGE ON A GRAPHICS LASER PRINTER

Jang Hun Lee
Major (P), Republic of Korea Army
B.S., Korea Military Academy, 1974

There is a current desire by Korean students at the Naval Postgraduate School (NPS) for using available computer systems for editing and printing the Korean character set (Hangul) for official reports and correspondence. Handwritten texts are not acceptable alternatives. There is an additional need to retrofit high performance western-produced computers for use by Koreans. This study attempts to attack both problems through the development of a Korean word processor on a U.S. computer, the Silicon Graphics, Inc. IRIS workstation, and an output capability on a U.S. produced laser printer, the QMS-1200.

Master of Science in
Computer Science
June 1986

Advisor: M.J. Zyda
Department of
Computer Science

A SOFTWARE IMPLEMENTATION OF AN INTERACTIVE GRAPHICS SYSTEM FOR THREE DIMENSIONAL MODELING AND LAYOUT

Surasak Mungsing
Flight Lieutenant, Royal Thai Air Force
B.S.E., University of South Florida, 1975
M. Eng., Chulalongkorn University, Thailand, 1984

This thesis examines interactive techniques for viewing a 3-D building model in a walkthrough fashion and for placing 3-D piping into a 3-D building model. The focus of research is software implementation using the C programming language and the IRIS Graphics Library on the Silicon Graphics Inc. IRIS Turbo 2400 interactive graphics system. The first part of the research is concerned with drawing, viewing a 3-D building model, and examining interactive techniques required for building a walkthrough mechanism. The second part is concerned with the development of techniques necessary to allow the placement of 3-D piping into a 3-D building model using 2-D graphics display and a mouse device. The algorithms and implementation of these techniques are presented.

Master of Science in
Computer Science
March 1986

Advisor: M.J. Zyda
Department of
Computer Science

IMPLEMENTATION OF A NATURAL LANGUAGE PROCESSOR USING FUNCTIONAL GRAMMAR

Fred Gregg Orchard
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1973

This thesis presents the design and implementation of a natural language processor using Functional Grammar. Traditionally, grammars have consisted of a set of words and a set of semantic and syntactic rules which combine the words to form sentences. Thus, the language is looked at as a syntactic structure which is used to derive meaning. Functional Grammar looks at language as a means of social interaction and applies the syntactic and semantic rules only after the meaning, based on pragmatics, of the sentance has been established. Prolog has been used to demonstrate how Functional Grammar can be used to provide that meaning.

Master of Science in
Computer Science
December 1985

Advisor: R.G. Marshall
Department of
Computer Science
U.S. Naval Academy
Annapolis, MD

DESIGN AND IMPLEMENTATION OF A C COMPILER FOR AN ABSTRACT MACHINE

Metin Gursel Ozisik
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1980

The technique of formal abstraction provides an appropriate tool for specifying an interface between layers of computer hardware and software. An abstract machine called AM has been built to address the problem of portability and reusability of software. This thesis is the design and implementation of a "C" compiler for this abstract machine.

Master of Science in
Computer Science
June 1986

Advisor: D.L. Davis
Department of
Computer Science

DYNAMIC SHARING OF THE SYSTEM RESOURCES IN MULTILEVEL SECURE SYSTEM

Miguel Angel Reyes La Hoz
Major, Peruvian Air Force
B.S., Peruvian Air Force Academy, 1973

This research represents a preliminary step in the development of a reliable application program simulating an operating system which handles several multisecurity-level users dynamically sharing system resources in the Gemini Trusted Multiple Microcomputer Base machine.

The proposed design presents the necessary steps to follow when working in a multilevel configuration. The use of primitives that support the application design are explained along with a description of the inplementation of this application using Janus/Ada language. In addition, security constraints are identified and system test results are described.

Master of Science in
Computer Science
September 1986

Advisor: G.S. Baker
Department of
Computer Science

ACCESSING AND UPDATING FUNCTIONAL DATABASES USING CODASYL-DML

Brian D. Rodeck
Captain, United States Marine Corps
B.S., Iowa State University, 1979

Traditional approaches to database system design and implementation involve single-model, single-language database systems with their inherent lack of flexibility and extensibility. An alternative to the traditional approach to database system design and implementation is the multi-lingual database system (MLDS). This approach allows the user to access and update one or many databases in different data models using corresponding data languages, thus countering the aforementioned flexibility and extensibility restrictions.

In this thesis, we present a methodology for accessing and updating databases stored in one model with the data manipulation facilities of a different data model. Specifically, we design an interface for allowing the network/CODASYL-DML user to access and update a functional database as supported by MLDS. This is the first step in the process of extending the multi-lingual database system to a true multi-model database system (MMDS).

Master of Science in
Computer Science
June 1986

Advisor: D.K. Hsiao
Department of
Computer Science

SOFTWARE PORTABILITY: A CASE STUDY OF THE MULTI-BACKENDED DATABASE SYSTEM

Bruce David Silberman
Lieutenant, United States Navy
B.S., Florida Technological University, 1978

The multi-backended database system (MBDS) is a database system designed for very large databases. MBDS is intended to provide consistent performance with increased capacity (or improved performance at a sustained capacity) by distributing the work of the system among several micro-computers connected to a common communication network. One of the issues central to the MBDS design is the portability of the system's software. This thesis provides a general discussion of the issues involved in software portability, and then presents a case study of the MBDS software system.

Master of Science in
Computer Science
June 1986

Advisor: D.K. Hsiao
Department of
Computer Science

IMPLEMENTATION OF A PERSONNEL DATABASE SYSTEM PERFORMING THE ANNUAL REASSIGNMENT OF THE OFFICERS OF A BRANCH DIRECTORATE OF THE HELLENIC ARMY GENERAL STAFF

Ioannis G. Strouzas
Major, Hellenic Army
B.A., Hellenic Army Academy, 1969

The Branch Directorates of the Hellenic Army General Staff (HAGS) currently perform the annual reassignment of their officers manually. The author proposes an automated system to perform this function, as well as other functions concerning personnel management, using dBASE III with a microcomputer which is fully software-compatible with the IBM/PC or IBM PC/XT. Source programs and sample reports are included.

Master of Science in
Computer Science
June 1986

Advisor: L.C. Rawlinson
Department of
Computer Science

IMPLEMENTATION OF A PERSONNEL DATABASE SYSTEM IN HELLENIC ARMED FORCES FORMATIONS

Panagiotis Tsagaris
Lieutenant Colonel, Hellenic Army
B.A., Hellenic Army Academy, 1968

Constantinos Karaiskos
Lieutenant, Hellenic Navy
B.A., Hellenic Naval Academy, 1974

The Hellenic Armed Forces Formations currently manage all personnel data manually. The authors propose an automated system to perform this function using dBASE II with an IBM personal computer. Source programs and sample reports are included.

Master of Science in
Computer Science
December 1985

Advisor: L.C. Rawlinson
Department of
Computer Science

A DATA DEFINITION LANGUAGE FOR GLAD

Kenneth Lewis Wartick
Captain, United States Marine Corps
B.S., United States Naval Academy, 1979

GLAD is an innovative approach to bringing the power of database processing to a larger audience. How this graphical interface approaches this goal is through pictorial representations that convey easily understood concepts to the unsophisticated user. GLAD incorporates many techniques to ease the effort required to effectively use a DBMS but is funded in four basic premises. These principles state that a DBMS interface must be descriptive, powerful, easy to use, and easy to learn.

This thesis proposes a data definition language (DDL) that both effectively describes the GLAD data model and, at the same time, is in accordance with GLAD's cardinal premises. The database creation process is examined to include incorporating integrity constraints, object relations and object properties. Next, the DDL to relational database, specifically INGRES, is examined. The thesis concludes with a series of appendices that demonstrate the proposed DDL, a formal specification and proposed guidelines.

Master of Science in
Computer Science
June 1986

Advisor: C.T. Wu
Department of
Computer Science

DEVELOPMENT OF A SHIPBOARD DAMAGE CONTROL FIRE TEAM LEADER INTELLIGENT COMPUTER AIDED INSTRUCTIONAL TUTORING SYSTEM

Stephen G. Weingart
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

We discuss the design and implementation of FIRE, an Intelligent Computer-Aided Instructional (ICAI) tutoring system. It tutors Fire Team Leaders on U.S. Naval ships in fire control, including dressing personnel, setting fire boundaries, extinguishing fires, performing gas tests, debriefing personnel, and recovering from personnel injuries and broken equipment. A computer game environment challenges the user with a random fire scenario at the user's experience level. Using a multi-level tree of expert recovery actions, FIRE can correctly choose the next best recovery action in any random fire scenario. Every incorrect student answer causes a formulation of a hypothesis concerning the cause of the behavioral difference between the student and an expert. This hypothesis guides selection of one of six possible tutoring strategies. The user can also perform a text-book-type lookup of correct action information.

Master of Science in
Computer Science
June 1986

Advisor: N.C. Rowe
Department of
Computer Science

THE DESIGN AND ANALYSIS OF A NETWORK INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM

Clemon R. Wortherly
Lieutenant, United States Navy
B.S., University of Texas, 1980

Traditionally, the design and implementation of a conventional database system begins with the choice of a data model followed by the specification of a model-based data language. Thus, the database system is restricted to a single data model and a specific data language. An alternative to this traditional approach to database-system development is the multi-lingual database system (MLDS). This alternative approach affords the user the ability to access and manage a large collection of databases, via several data models and their corresponding data languages, without the aforementioned restriction.

In this thesis, we present a methodology for supporting network (CODASYL) database management on the MLDS. Specifically, we design an interface which translates CODASYL-DML statements into ABDL requests.

We describe the data structures, the control mechanisms, and the functions/procedures necessary to implement such a system.

Master of Science in
Computer Science
December 1985

Advisor: D.K. Hsiao
Department of
Computer Science

AN APPROACH TO THE CONCEPT OF ERROR RECOVERY IN THE NATIONAL STOCK NUMBER SYSTEM

Mehmet Yenen
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1980

This thesis pertains to the area of systematic error recovery for the National Supply System. By techniques applied to real stock numbers a correction algorithm is successfully developed. The main research area for this thesis is that of algebraic coding theory, especially Reed-Solomon codes and their application for the National Supply System using finite field theory and the RS code over GF(11).

The findings of the research are also discussed for a possible database interface. This product of the study may be used to assist supply officers and other officials developing an error correction mechanism in order to have a more reliable and efficient supply system.

Master of Science in
Computer Science
June 1986

Advisor: H. Fredricksen
Department of
Mathematics

THE FORMAL SPECIFICATION OF AN ABSTRACT DATABASE; DESIGN AND IMPLEMENTATION

Klaus-Harald Zang
Lieutenant, German Navy

The technique of problem solving abstraction provides an appropriate tool for specifying an interface between the layers of computer hardware and software. Based on this methodology, the types of support and function calls that should be provided to application programs running on micro computers are described with respect to a database resource. The database is integrated with an abstract processor called AM, a machine which focuses on eliminating the problems with portability and reusability of software, imposed by insufficient resource abstraction.

Master of Science in
Computer Science
December 1985

Advisor: D.L. Davis
Department of
Computer Science

MASTER OF SCIENCE

IN

ELECTRICAL ENGINEERING

SURFACE SHIP FUEL SAVINGS WITH AN OPTIMIZED AUTOPILOT

Volkan Akinsal
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

This example of a thesis explains how to effectively use the THESIS9 thesis preparation package. This example includes an index to improve its usefulness as documentation. However, an index is not part of accepted thesis format. It is intended that the THESIS9 commands produce all requirements of the NPS Thesis Manual dated 5/83, including changes announced by the registrar's office 8/84. In addition, they provide some features that simplify thesis preparation. All headings, the table of contents, figures, tables and references are automatically numbered or lettered as required. Paragraphs within sections and subsections are indented as required. The format is suitable for unclassified theses only.

Master of Science in
Electrical Engineering
December 1985

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

REDUCTION IN BANDWIDTH BY USING VARIABLE LENGTH CODES

Serdar Akinsel
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

A method of coding an ensemble of messages of a finite number of symbols is developed. Minimizing the average number of coding digits per message by using Huffman coding can result in a large variance. This is a problem because a large variance requires a large buffer and also creates more time delay during transmission and decoding respectively for on-line communication.

This research examines modified Huffman codes for the purpose of finding a way to reduce the variance. The effective parameters which give the lower variance modified Huffman codes are obtained. The buffer requirements and the reduction of the bandwidth to forward messages in an on-line communication is investigated. A possible design for a practical system is presented for using the modified Huffman codes.

Master of Science in
Electrical Engineering
December 1985

Advisor: R.W. Hamming
Department of
Computer Science

DIGITALLY CONTROLLED "PROGRAMMABLE" ACTIVE FILTERS

Panagiotis Andresakis
Lieutanant, Hellenic Navy
B.S., Hellenic Naval Academy, 1977

In this research a general purpose digitally controlled analog filter is presented. The novel design is a cascade of second order sections that are individually programmed to achieve any filtering topologies. Two-binary words are used to control the pole frequency ω_p and selectivity Q_p of each section independently. Each second-order section is a Generalized-Immittance Converter (GIC) biquads which are known for their high stability and low active and passive sensitivity. CMOS switches are used to electronically relocate the minimum number of passive elements to achieve function programmability. Switches are also used to select the number of cascaded sections to realize higher order transfer functions.

Master of Science in
Electrical Engineering
December 1985

Advisor: S. Michael
Department of
Electrical and Computer
Engineering

TESTING METHODS FOR INTEGRATED CIRCUIT CHIPS

Zafer Betoner
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1978

Provision for the functional testing of fabricated VLSI chips frequently involves as much design effort as the original chip design itself. Often the hardware requirements for testing involve a large expense.

This research investigates the logical and functional requirements for chip testing. Available approaches are examined and their capabilities noted. Methods of communication between the test controller and the device under test are examined as well as logical structure of the test controller.

Two candidate approaches are selected for comparison. (1) A standard general-purpose processor with standard bus interface serves as the test controller and (2) a custom VLSI test controller interfacing directly to the device under test. As a result, a test system architecture is proposed.

Master of Science in
Electrical Engineering
March 1986

Advisor: M.L. Cotton
Department of
Electrical and Computer
Engineering

AN INTERACTIVE COMPUTER AIDED DESIGN AND ANALYSIS PACKAGE

John Curtis Bordeaux
Major, United States Marine Corps
B.S., Old Dominion University, 1975

In this thesis a NASA developed Markov reliability analysis tool will be ported to a relatively inexpensive IBM-AT environment. Currently the Markov analysis tool, called SURE, is not widely utilized because it runs in an expensive environment consisting of a VAX, megatex display, and template graphics software. Although substantial savings can be made by running SURE without the expensive graphics, the user friendliness of the tool is dramatically degraded by the lack of graphics. Accordingly a C program using the inexpensive GEM graphics environment has been written. The program is user friendly; it uses menus for option selections and prompts for data entry.

Master of Science in
Electrical Engineering
September 1986

Advisor: L.W. Abbott
Department of
Electrical and Computer
Engineering

AN AUTONOMOUS CIRCUIT FOR THE MEASUREMENT OF PHOTOVOLTAIC DEVICES PARAMETERS

Robert Kendall Callaway
Lieutenant, United States Navy
B.A., California State University, Chico, 1978

In this research a novel autonomous test system is presented. The system is a self contained microprocessor based experiment, which was developed to compare and test different state-of-the-art Gallium Arsenide and Silicon solar cells. The result will help evaluate radiation hardness properties of both types of solar cells. The system can also be used to study the annealing process as well as shadowing effects in space array systems. Stringent requirements were considered in designing the system for durable operation in a space environment.

Master of Science in
Electrical Engineering
September 1986

Advisor: S. Michael
Department of
Electrical and Computer
Engineering

MULTICHANNEL COLLISION RESOLUTION ALGORITHM

Joo Hyung Cho
Major, Republic of Korea Air Force
B.S., Korean Air Force Academy, 1975

A multichannel random accessed communication system was considered. Every time slotted channel is shared by a large number of transmitters. To solve a collision which occurs at a certain time slot, several collision resolution protocols were tested, analyzed, and simulated. The quantities to be investigated in this thesis include $\bar{L}_n$ (the average number of slots required to resolve a collision involving n users), linear bounding of $\bar{L}_n$ and the maximal achievable throughput.

Master of Science in
Electrical Engineering
December 1985

Advisor: J.-F. Chang
Department of
Electrical and Computer
Engineering

AN EXPERIMENTAL TEST OF MINORITY CARRIER ANNEALING ON GALLIUM ARSENIDE SOLAR CELLS USING FORWARD-BIASED CURRENT

Thomas Fredrick Clark
Lieutenant, United States Navy
B.S., University of Oklahoma, 1979

There has been recent interest in providing an on-orbit solar cell annealing capability. Minority carrier injection annealing was examined using a 0.5A/cm^2 forward-biased current density on gallium arsenide solar cells in a 90 degree centigrade ambient environment. The cells had been irradiated with 1-Mev electrons for a total fluence of 3E15e1/cm^2. When annealing stopped, after 48 hours, the procedure had recovered 30% of the maximum power that was lost due to radiation damage. This procedure may have on-orbit potential.

Master of Science in
Electrical Engineering
September 1986

Advisor: S. Michael
Department of
Electrical and Computer
Engineering

IMAGE SEGMENTATION USING THE MILITARY SPECIFICATION 1750A MICROPROCESSOR

Percy Dean Cody, III
Lieutenant, United States Navy
B.S.E.E., University of Kansas, 1980

The use of digital computers to process various types of sensor data is becoming increasingly common, in both civilian and military applications. One example of this use is the enhancement of photographs to increase their clarity, or emphasize a particular detail.

Previously, the computers used to perform this processing was done in specialized circuits, mainframe or minicomputers. More recently, extremely powerful microprocessors have become available that show potential to be applied in this area.

This thesis explores a particular class of image processing, known as Image Segmentation, implemented on a particular microprocessor. The microprocessor is the Fairchild F9450, the first civilian version of the 1750A military specification microprocessor.

This microprocessor, along with its associated chip set, appears well suited to image processing, having high speed capability, direct floating point arithmetic instructions, multiprocessing capacity, and the ability to address up to sixteen megabytes of memory.

Additionally, a sophisticated software development tool set, known as Microprocessor Pascal, is available to develop and test software for the 1750A/F9450 microprocessor. This tool set allows software to be developed on the VAX-11/780 minicomputer, targeted for final use on the 1750A/F9450.

This work utilized the Microprocessor Pascal tool set to test and compare representative Image Segmentation algorithms. The speeds of execution and code sizes of the programs were determined for the F9450/1750A microprocessor and the VAX-11/780 minicomputer, and were compared to determine the feasibility of using the F9450/1750A microprocessor for image segmentation work.

Several images resulting from the image segmentation processing are included, as well as the Pascal programs used to perform the processing.

Master of Science in
Electrical Engineering
December 1985

Advisor: C.H. Lee
Department of
Electrical and Computer
Engineering

MULTILEVEL SECURE FRONT END FOR DATA COMMUNICATIONS

Philip J. Corbett
Lieutenant, United States Navy
B.S., U.S. Naval Academy, 1977

This thesis demonstrates the feasibility of using a multilevel secure computer system to augment traditional security measures used to safeguard sensitive information in an office to office communication environment. A multilevel secure communication interface can be used for high speed transmission of a wide variety of computerized information, from text files, to large volumes of bulk data including computer program listings. Such a system significantly reduces the delays associated with traditional transmission techniques such as couriers, and registered mail. The ability to encrypt all external communications provides additional security. By automating message processing functions, providing secure storage devices, and restricting access to sensitive information, the multilevel secure communication interface can greatly improve overall system security.

Master of Science in
Electrical Engineering
March 1984

Advisor: U.R. Kodres
Department of
Electrical and Computer
Engineering

BRUSHLESS DC MOTORS, VELOCITY AND POSITION CONTROL OF THE BRUSHLESS DC MOTOR

Nezih Y. Durusu
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1978

A velocity feedback controller for the brushless DC motor was designed using the Hall effect sensors. In addition, the position control of the brushless DC motor was developed using an optical encoder to sense angular position changes and a microprocessor to provide the desired position control. A Pittman 5111 wdg #1 brushless DC motor was used for this study. The design of the digital tachometer and pulse width modulator for velocity control and the design of the Z-80 based microprocessor controller and software design are described in detail.

Master of Science in
Electrical Engineering
June 1986

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

A SOLID STATE DATA RECORDER FOR SPACE-BASED APPLICATIONS USING MAGNETIC BUBBLE MEMORY

Tina-Marie D'Ercole
Lieutenant, United States Navy
B.S., United States Naval Academy, 1980

Earthbound recording systems come in many sizes and use various mediums on which to record the data. The harsh environment of space, however, introduces some unique problems. This limits the number of choices not only for the type of system but also for the optimum recording medium. How changes in temperature, radiation, lack of air, etc., affect the performance of the device as a whole must all be considered.

Magnetic bubble memory technology implemented in a solid state recorder is a possible solution. Included in this thesis is a description of the development and history of the magnetic bubble memory, along with a comparison to other technologies. The design and implementation of a digital data recorder using off-the-shelf four-megabit devices is presented. A schematic of the data recorder and software used is included in the appendices.

Master of Science in
Electrical Engineering
March 1986

Advisor: R. Panholzer
Department of
Electrical and Computer
Engineering

AN INTERACTIVE COMPUTER AIDED DESIGN AND ANALYSIS PACKAGE

Terrence Lee Ewald
Lieutenant, United States Navy
B.S., University of Missouri, Columbia, 1981

In this thesis the development of a controls system analysis package is discussed. It is an interactive computer aid for the design and analysis of linear, single input/single output feedback control systems. The program is user friendly; it uses menus for option selections and prompts for data entry. The program will manipulate the transfer functions of multi-loop systems to produce the open and closed loop transfer functions required for a variety of analysis techniques. The output from any analysis may be either a tabulation of data points or a high resolution plot.

Master of Science in
Electrical Engineering
March 1986

Advisor: G. Thaler
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IMPROVING THE PERFORMANCE OF A MILLIMETER-WAVE SCALAR NETWORK ANALYZER

David E. Falkner
Lieutenant, United States Navy
B.S., Purdue University, 1980

This thesis describes improvements made to an existing Millimeter-Wave Scalar Network Analyzer. The system is automated and can be used to make return and/or insertion loss measurements from 60 to 90 GHz. Measurement data can be printed or plotted on a CRT or thermal printer. Additionally, a high resolution plot with up to 4 colors can be made on an external plotter.

Other topics which are discussed include software modification, improved performance in measurement taking, dynamic range of the system, component influence on measurements and comparison of device measurements with those obtained from previous theses and manufacturer specifications.

Master of Science in
Electrical Engineering
September 1986

Advisor: J.B. Knorr
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Engineering

A 32-BIT MICROPROCESSOR BASED SOLID STATE DATA RECORDER FOR SPACE APPLICATIONS

Thomas Joseph Frey, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1977

A need exists for non-volatile, reliable and radiation hardened mass data storage devices for space applications. Tape recorders modified for use in the space environment have proven both expensive and unreliable. The use of magnetic bubble memory as a recording medium in recent space projects offers a promising alternative to tape recorders. This thesis develops the design of a 32-bit microprocessor based advanced solid state data recorder for space based applications utilizing two-megabyte magnetic bubble memory boards as the storage medium.

Master of Science in
Electrical Engineering
March 1986

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Engineering

THE ANALYSIS AND DESIGN OF A PARAMETERIZED PROTOCOL CONVERTOR

Berle Garris, Jr.
Captain, United States Marine Corps
B.S., United States Naval Academy, 1979

Designed to circumvent the incompatibilities between communicating computer systems, a parameterized protocol convertor permits the use of communication equipment supporting variations of the same communication protocol or completely different framing technique protocols. The analysis of the conversion process includes the engineering trade-offs between speed of conversion and flexibility, and the use of an alternative flow architecture. Flexibility is enhanced through user selection of input and output protocol types, and the designation of functional specifics, such as code type, header length, and error detection methods, with variable parameters. The speed of conversion is increased through the parallel processing of the framing, transparency, and error control sub-functions and the use of a single byte storage technique. The single byte storage technique imposes some limitations in the use of transparent data.

Master of Science in
Electrical Engineering
December 1985

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HIGH ENERGY ELECTRON RADIATION DEGRADATION OF GALLIUM ARSENIDE SOLAR CELLS

Don William Gold
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

A need existed to perform high energy electron irradiation experiments on gallium arsenide solar cells. To support this research, an automated solar cell test facility was constructed, gallium arsenide solar cells were obtained, and the Naval Postgraduate School LINAC facility was utilized to irradiate the cells to selected fluence levels at 20 MEV energies. Equivalent damage coefficients were calculated, and it was found that the average maximum power output decreased by 50% following a cumulative irradiation by electrons to a total fluence of 1×10^{15} e/cm^2.

Master of Science in
Electrical Engineering
March 1986

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Aeronautics

PRACTICAL CONSIDERATIONS OF THE TOPOLOGICAL APPROACH TO ELECTROMAGNETIC INTERFERENCE CONTROL

Thomas Leopold Grodek
Lieutenant, United States Navy
B.S.E.E., United States Naval Academy, 1978

The topological approach to electromagentic interference control is described and explained for background. Some of the issues concerning the implementation of an equipment-level topological barrier at electronics facilities are discussed. Experiments are conducted on a cotton 19-inch equipment rack to investigate and evaluate topological grounding techniques and the proper connection of a penetrating conductor filter. Additional experiments are conducted to evaluate the use of double-shielded coaxial cable.

Master of Science in
Electrical Engineering
March 1986

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Electrical and Computer
Engineering

PERFORMANCE ANALYSIS OF MODIFIED M-ARY AND QAM SIGNALING SCHEMES IN THE PRESENCE OF NOISE AND JAMMING

Fikret Gunes
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

The purpose of this thesis is to evaluate and compare the performance of certain M-ary digital modulation schemes such as MPSK, QAM and certain modifications to these which have not been considered in previous analyses. The performance of these receivers is evaluated in terms of probability of error as a function of signal to noise ratio (SNR). Design trade-offs are considered and their effect on system performance evaluated. One of the schemes considered is further evaluated in terms of its vulnerability to jamming. Using a colored Gaussian noise model, jamming effects are evaluated by determining the receiver error probability as a function of both SNR and jamming to signal ratio (JSR). An optimum jamming scheme that is derived using a maximum power constraint is presented and its effect on the performance of a 16-QAM receiver designed to operate in an additive white Gaussian noise (AWGN) only interference is evaluated.

Master of Science in
Electrical Engineering
June 1986

Advisor: D. Bukofzer
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Electrical and Computer
Engineering

AN ADAPTIVE COLLISION RESOLUTION PROTOCOL FOR RANDOM ACCESSED CHANNELS

Turhan Gurer
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

This thesis investigates the performance of two collision resolution protocols for a random accessed channel. The two proposed protocols are basically multislot collision resolution algorithms. In the first protocol, the number of slots opened is equal to the number of users in ved in a collision. Each user randomly selects a slot. The second protocol is an adaptive version of the first protocol. Both of them are investigated numeric calculations and simulations.

Master of Science in
Electrical Engineering
December 1985

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Electrical and Computer
Engineering

ANALYSIS OF A DISTRIBUTED DECISION ALGORITHM

Sung Chu Hahn
Major, Republic of Korea Air Force
B.S., Republic of Korea Air Force Academy, 1976

Distributed decision problems arise whenever two or more sensors and their associated computers must work cooperatively to make a decision about a commonly observed event. Typical examples are in target detection and classification. The problem is usually characterized by a limited bandwidth of the communication link between the sensors.

This thesis develops and evaluates an algorithm for distributed decision and compares it to a non-distributed or centralized form of the algorithm. Analysis of the algorithm is carried out for some low-dimensional cases. Computer simulations were carried out for higher dimensional cases. The simulation work was done in Fortran under CMS on an IBM 370/3033 computer.

Master of Science in
Electrical Engineering
December 1985

Advisor: C.W. Therrien
Department of
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Engineering

ALGORITHM FOR SEGMENTATION OF MULTICHANNEL IMAGES

James Frank Janecek
Captain, United States Marine Corps
B.S., Marquette University, 1976

Segmentation is an important step in the computer based analysis of images. This thesis addresses the segmentation of images of multiple channels of data. Such images are referred to as multichannel images. Examples of these are color images, where the channels represent color components, and remote sensing data, where the channels may represent signals from various visible and infrared frequency bands. This thesis describes and demonstrates how segmentation of multichannel images into homogeneous regions can be accomplished using linear predictive filtering. Results are given for some synthetically generated color images of two textures.

Master of Science in
Electrical Engineering
December 1985

Advisor: C.W. Therrien
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Engineering

ORTHOGONAL LATTICE MODELING OF NONLINEAR SYSTEMS

Scot Lee Johnson
Lieutenant, United States Navy
B.S., University of Minnesota, 1979

The application of analysis lattice filters to the problem of determining the input to a system from observations of the system's output (i.e., deconvolution) is discussed. Both linear and nonlinear systems are considered. Lattice filter modeling algorithms (Levinson and Schur) are presented.

The theory of least-squares inverse filters is reviewed. This leads to a discussion of the lattice filter, which in turn leads to the Generalized Lattice Theory. The Generalized Lattice Theory is then used to develop a nonlinear lattice structure. Simulations show that the nonlinear lattice is an effective inverse filter for both linear and nonlinear systems.

Master of Science in
Electrical Engineering
September 1986

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Electrical and Computer
Engineering

FIXED POINT SMOOTHING ALGORITHM TO THE TORPEDO TRACKING PROBLEM

Sadi Karaman
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

A sequential extended Kalman filter and optimal smoothing algorithm was developed to provide real time estimates of torpedo position and depth on the three dimensional underwater tracking range at the Naval Torpedo Station, Keyport, Washington. The measurements consisted of acoustic pulse transit times from the torpedo to receiving array, which are nonlinear functions of the positions and the depth of the torpedo, were linearized and filter gains and filtered estimates of states calculated. By running the smoothing subroutine, all past filtered estimates of states and error covariance were smoothed. The program was tested, using simulated torpedo trajectories that traversed both single and multiple arrays, on an IBM-PC. The results showed that filter performance was dependent on system noise and the distance to the hydrophone array from the torpedo and the smoothed estimates of states and error covariances were better than or equal to the filtered estimates.

Master of Science in
Electrical Engineering
June 1986

Advisor: H.A. Titus
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Engineering

OPTIMAL ESTIMATION OF TARGET IN CLUTTER (CHAFF) FROM RADAR

Akylas Dim. Katsicogiannis
Lieutenent, Hellenic Navy
B.S., Greek Naval Academy, 1976

This work produced a simulation capable of giving the effectiveness of chaff used in the self-protective mode. Signal processing techniques were studied in chaff discrimination in crucial missile conditions. A missile-ship-chaff model will be constructed to provide the optimum confusion of the missile. The radar included in this simulation is a tracking radar with conical-scan modulation. Results of simulation runs illustrate the effects of varying chaff radar cross section when ship and chaff are in the same resolution cell.

Master of Science in
Electrical Engineering
December 1985

Advisor: H.A. Titus
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Engineering

MULTISIMPC: A MULTILEVEL LOGIC SIMULATOR FOR MICROCOMPUTERS

J. Scott Kelly
Lieutenant, United States Navy
B.E.E., Georgia Institute of Technology, 1979

This thesis describes extensions to a multilevel VLSI logic simulator named MultiSim. Originally developed by Dr. Ausif Mahmood of the Washington State University for large minicomputers such as the VAX-11/780, MultiSim is now operational on desktop microcomputers costing only a few thousand dollars. In addition, MultiSim has been expanded to include provisions for adding user-defined primitive cells to the circuit library, true multilevel circuit expansion, and multiple variations of library primitives within a single circuit.

Master of Science in
Electrical Engineering
September 1986

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INTERACTIVE RECONSTRUCTION OF COMPRESSED IMAGES

Alfred Ledesma
Lieutenant, United States Navy
B.S., University of Texas, 1979

By using irregular sampling, an image may be digitized by concentrating sampling in areas of interest and reducing sampling in other areas. With this approach storage required for the digital image is more efficiently used and is usually reduced.

This thesis explores an interactive method for reconstructing a compressed image. An interactive method allows human intuition to be combined with the speed and versatility of a computer. The user is able to guide the reconstruction through difficult cases of loop connectivity, branch linkup, and triangulation. MOSAIC, an element of MOVIE.BYU, is used for this reconstruction.

This study shows that an interactive method has both good and bad points. Better reconstruction results when working with large, well-formed contours. When working with small, irregular shaped contours a significant loss of detail occurs.

Master of Science in
Electrical Engineering
June 1986

Advisor: C.-H. Lee
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Electrical and Computer
Engineering

JAMMING EFFECTS ON DIGITAL COMMUNICATION RECEIVERS (TIMING ERRORS AND FREQUENCY ERRORS)

Suk Ho Lee
Major, Republic of Korea Air Force
B.S., Korean Air Force Academy, 1977

A refinement of the results obtained for optimum energy constrained jamming of digital receivers is obtained by modeling the jammer as a random process. In the modeling process, a random time arrival or random frequency errors are accounted for by including these effects in the representation of the jamming waveforms. Performance analyses are carried out in order to determine the effect of random time of arrival and random frequency errors on the part of the jammer, on the receiver probability of error.

The mathematical results derived are programmed, evaluated on the computer, and compared against ideal optimum energy constrained jamming strategies previously studied. Results for both coherent and incoherent receivers are derived and analyzed utilizing conventional binary modulation schemes. Results show that generally some but not a great deal of jammer effectiveness is lost due to random time of arrival or random frequency errors associated with the jammer waveform.

Master of Science in
Electrical Engineering
December 1985

Advisor: D. Bukofzer
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Engineering

MEASURED NOISE PERFORMANCE OF A POST-DETECTION LIMITER CIRCUIT IN THE RECEIVER OF A BINARY DATA TRANSMISSION SYSTEM

William John Luk
Captain, United States Army
B.S., United States Military Academy, 1976

Binary phase shift keying is a common modulation method for transmitting binary data because of its superior noise performance. A proposed alternative to the common BPSK receiver is use of three parallel post-detection circuits and majority decision logic to reduce errors, improving the overall performance of the BPSK system. The noise performance of each of two parallel circuits was measured and compared. The first circuit is a conventional BPSK receiver using an integrate and dump circuit. The second circuit incorporates a limiter after the demodulator and prior to the integrate and dump circuit. The conventional circuit is found to provide the same error probability at a 0.2 dB smaller signal to noise ratio. The probability density function of the voltage at various nodes in the post-detection circuits are measured and included in the report along with curves of probability of error versus SNR for the two post-detection circuits.

Master of Science in
Electrical Engineering
March 1986

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Electrical and Computer
Engineering

NUMERICAL MODELS OF NEW HF SHIPBOARD COMMUNICATION ANTENNA SYSTEMS FOR IMPROVED SURVIVABILITY

George L. Lyberopoulos
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1976

There are many shipboard communication antenna problems where the number, type, location, or survivability of a given antenna in the system is a parameter which can be varied to determine the overall optimal system.

This thesis investigates computer numerical models for improving the time that an HF shipboard combat survivable antenna system can endure in a given environment. The future generation of ships will have low profile combat survivable antennas; an interim solution for present ships is the elimination of fragile HF antennas by exciting existing masts. The antenna is modeled as a mast with dimensions 24 X 3 X 3 meters. Several computer models of the driven antenna are modeled using the Numerical Electromagnetic Code (NEC). Input impedances and radiation patterns of the antenna are presented.

Master of Science in
Electrical Engineering
June 1986

Advisor: R.W. Adler
Department of
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SILICON COMPILATION AND A LISP-BASED LAYOUT LANGUAGE

Manuel Ambrosio Malagon-Fajar
Lieutenant Commander, United States Navy
B.S., Massachusetts Institute of Technology, 1974

Two related silicon compilers developed at MIT Lincoln Laboratories with common layout language are examined. The simpler one, the Lincoln Boolean Synthesizer (LBS), is a Complementary Metal Oxide (CMOS) technology based program for generating chips out of arbitrary boolean expressions. MacPitts, on the other hand, implements advanced programming language constructs in N-Channel (NMOS) technology. A study of their layout language, Lincoln Laboratory's LISP-based Layout Language (L5), and its use is presented. In addition, there is also a brief discussion of how MacPitts' functional repertoire can be changed.

Master of Science in
Electrical Engineering
June 1986

Advisor: D.E. Kirk
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Electrical and Computer
Engineering

SATELLITE TRACKING AND OBSERVABILITY

Michele G. Mort
Lieutenant, United States Navy
B.A., Lycoming College, 1977

The purpose of this thesis is to research the availability of targets moving on or near the earth's surface when viewed by an orbiting satellite. A discussion of basic orbital mechanics is presented as well as a development of a suitable coordinate system. An analysis of non-linear observability is then provided. Lastly, an observer is designed and successfully simulated.

Master of Science in
Electrical Engineering
March 1986

Advisor: S.R. Turajlic
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ANALYSIS OF PERIODIC BINARY SEQUENCES

Jarratt M. Mowery
Lieutenant, United States Navy
B.S., Western Washington University, 1979

This thesis is concerned with the harmonic analysis of periodic binary sequences using the Discrete Fourier Transform. The effects of various types of noise on the spectral content of a sequence are investigated. Assuming independent identical Normal distributions for errors, a method for the application of Fisher's test is proposed to provide a quantitative measure of the significance of spectral components. This proposed method is implemented by computer program and applied to the problem of estimating the period of noise garbled pseudo-random binary sequences.

Master of Science in
Electrical Engineering
June 1986

Advisor: H. Fredricksen
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Mathematics

JAMMING EFFECTS ON M-ARY COHERENT AND BINARY NONCOHERENT DIGITAL RECEIVERS USING RANDOM JAMMER MODELS

Luis Alberto Munoz
Major, Peruvian Army
B.S., Peruvian Army Institute of Technology, 1980

The purpose of this work is to analyze and evaluate the effect of jamming waveforms on both coherent and noncoherent digital communications receivers. Specifically, random processes are utilized as jamming models in which it is assumed that the jamming waveforms have been produced by a shaping filter driven by white Gaussian noise. Such jamming waveforms are then assumed to be present at the input of known receiver structures (in addition to the signals and channel noise normally present), and optimum jamming waveform spectra are determined for different receiver schemes and modulation techniques.

Graphical results based on numerical analyses are presented in order to demonstrate the effect of different jamming strategies on receiver performance. In order to quantify receiver performance, bit error probabilities are determined for binary modulation systems and symbol error probabilities are determined for M-ary modulation systems. In each case, the error probabilities are functions of signal-to-noise ratio (SNR) and jammer-to-signal ratio (JSR). Results show that it is generally possible to significantly degrade the performance of binary as well as M-ary modulation communication receivers by introducing suitably chosen jamming waveforms.

Master of Science in
Electrical Engineering
December 1985

Advisor: D. Bukofzer
Department of
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BROADBAND TECHNIQUES APPLIED TO SHIPBOARD HF SLOT ANTENNAS

Mario Cabral Neiva
Lieutenant Commander, Brazilian Navy
B.S., Brazilian Naval Academy, 1969
B.S.E.E., University of Sao Paulo, 1975

One of the major problems in communications aboard ships is the minimization of the number of antennas, avoiding undesirable coupling between them and interference between links, therefore reducing the exposed area of ships.

In the future, for the next generation of ships the trend will be the elimination of tall and large structures to make antennas more survivable during combat.

The use of slot antennas along the bulkheads of the superstructure and broadband techniques applied to them seems to be a good candidate for solving these problems.

This thesis investigates a model of a slot antenna using the Numerical Electromagnetics Code (NEC). Input impedance, near field inside the slot and radiation patterns are presented .

Master of Science in
Electrical Engineering
June 1986

Advisor: R.W. Adler
Department of
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Engineering

THE SYNERGISTICALLY INTEGRATED RELIABILITY ARCHITECTURE: A RELIABILITY ANALYSIS OF AN ULTRA-RELIABLE FAULT TOLERANT COMPUTER DESIGN

Ronald J. Nelson
Captain, United States Army
B.S.E.E., Virginia Polytechnic and State University, 1977

This thesis develops a Semi-Markov reliability model for the Synergistically Integrated Reliability (SIR) computer architecture. The SIR architecture is an advanced hybrid redundancy scheme that combines several current reliability techniques to achieve hardware and software reliability. These methods include hybrid redundancy, N-Version programming, and source congruent data interchange. The architecture is designed to support active control systems in the aircraft avionics industry as well as the bus controller requirements for the dispersed Sensor Processor Mesh (DSPM) system for ultra-reliable computer communications. The paper also develops high level algorithms for fault detection, location, and configuration management within the SIR system.

The reliability model integrates the hardware design, the hybrid redundancy philosophy, and the operating constraints of an active control system into a single reliability model. Specific models are developed for the 3, 4, and 5 processor cases of the SIR architecture and plots of the system reliability vs. mission time are generated using the SURE Reliability Analysis Program.

Master of Science in
Electrical Engineering
September 1986

Advisor: L. Abbott
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PASSIVE ACOUSTIC TARGET MOTION ANALYSIS

George Edward Olcovich
Lieutenant Commander, United States Navy
B.S., University of Redlands, 1974

The technique of Extended Kalman filtering is applied to a passive acoustic target motion analysis problem. A multisensor tracking algorithm is developed to provide a solution to the maneuvering target problem based on noisy passive bearing and doppler shifted frequency measurements. An adaptive control method is used to allow for maneuvering. The performance of the filter is also evaluated using computer generated doppler frequency and bearing data. The performance of the filter is found to be acceptable under the tested conditions.

Master of Science in
Electrical Engineering
June 1986

Advisor: H. Titus
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Engineering

ADAPTIVE CONTROL WITH FINITE TIME PERSISTENCY OF EXCITATION

Irfan Onuk
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

An indirect adaptive control algorithm has been studied to control physical systems with parameter uncertainties. Although the particul r algorithm investigated is applicable to a wide class of discrete time linear systems, parameter convergence and therefore global stability of the whole system is guaranteed only if the external excitation contains a sufficiently large number of frequency components. This research study has also investigated the possibility of stopping the identification procedure when the parameter error becomes sufficiently small, so the controller automatically turns itself from adaptive to time invariant, while still guaranteeing global stability of the closed-loop system. In this way the adaptive controller might be activated only when its gains do not provide satisfactory performances. Computer programs of the indirect adaptive control have been written for simulation purposes using both recursive least squares and projection algorithms.

Master of Science in
Electrical Engineering
June 1986

Advisor: R. Cristi
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Engineering

BOOST CONTROL DESIGN FOR SPINNING MISSILE

Richard L. Park, Jr.
Captain, United States Marine Corps
B.M.E., Georgia Institute of Technology, 1980

A compensation scheme is presented for the pitch-yaw control system of a strategic missile which maintains stability and performance while the missile spins. The conventional missile control design for boost has uncoupled pitch, yaw and roll channels ideally suited for a non-rolling missile. The effect roll has on the conventional pitch-yaw controller is discussed and the development and simulation of a modified system is presented.

Master of Science in
Electrical Engineering
December 1985

Advisor: R.D. Strum
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Engineering

FEEDBACK CONTROL ANALYSIS USING PARAMETER PLANE TECHNIQUES

Daniel M. Potter
Lieutenant, United States Navy
B.S., Syracuse University, 1977

The immediate attention of the control systems engineer is directed to the dynamic behavior of the system under study. It is important to study the effects on overall system performance of varying one or more parameters (mass, inertia, gain, resistance, etc.). It is equally important to determine whether a desired dynamic behavior can be achieved with any set of values for the parameters--if not, redesign is indicated.

In this thesis a control systems analysis package is developed using parameter plane methods. It is an interactive, user-friendly computer aid. Given a characteristic equation containing two variable parameters, the output of the analysis may be either tabular or graphical, with plots of any of the following types:

1. Constant damping curves as a function of frequency.
2. Constant frequency curves as a function of damping.
3. Constant sigma lines (real root lines),
4. Constant zeta-omega (damping-frequency) curves.

Master of Science in
Electrical Engineering
June 1986

Advisor: G.J. Thaler
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Engineering

RANGE IMAGE PROCESSING FOR LOCAL NAVIGATION OF AN AUTONOMOUS LAND VEHICLE

Dennis Duane Poulos
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1975

A central emphasis for robotic research over the last few decades has been to make the systems autonomous. This implies simulating the human senses with electronic sensors and then deriving knowledge about the environment from those sensors. A large base of research exists that concentrates on computer vision algorithms that attempt to duplicate human vision. For the most part, this research has concentrated primarily on two dimensional techniques due to limitations in the available optical technology.

Real time range image processing is now feasible with the introduction of the ERIM Laser Scanner as installed on the Ohio State Adaptive Suspension Vehicle (ASV). The purpose of this thesis is to utilize the three dimensional data from the Laser Scanner and by rule-based programming techniques generate a local terrain feature model for use by an Autonomous Land Vehicle. Future applications of this technology include an autonomous Lunar Rover or autonomous service/repair robots operating in close proximity to the Space Station.

Master of Science in
Electrical Engineering
September 1986

Advisor: R.B. McGhee
Department of
Computer Science

RECOGNITION OF TWO-DIMENSIONAL SHAPES

Gim Pew Quek
Ministry of Defense, Singapore
B. Eng. (Hons), National University of Singapore, 1981

A new scheme for coding the boundary of two-dimensional shapes is proposed. Random points on the boundary are paired for this coding. Using this scheme, an effective and efficient correlation technique to match two-dimensional shapes is developed.

This technique has a number of very desirable characteristics. It is able to match shapes of arbitrary scale and orientation. The given shape may have closed or open boundary or even have portion of it obstructed from view. Matching can be performed at varying degrees of details, giving this technique an added robustness against geometric distortions. It also has the capability to discriminate between different shapes.

Computation time on the IBM 3033 computer is typically 10 CPU seconds to generate one correlation curve between two shapes, each with a 500-point boundary curve.

Master of Science in
Electrical Engineering
March 1986

Advisor: C.H. Lee
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Engineering

IMAGE ANALYSIS OF SOLID PROPELLANT COMBUSTION HOLOGRAMS USING AN IMAGEACTION SOFTWARE PACKAGE

David Norman Rodman
Major, Canadian Armed Forces
B.Eng., Royal Military College of Canada, 1976

This thesis describes a method of computer-controlled image enhancement and particle data retrieval from combustion hologram images. It describes the use of ImageAction software for the filtering and processing of the hologram images, and then describes a Fortran program which was written to extract the particle feature data from the modified image. The ImageAction software and the Fortran program were run on an IBM/AT computer. Preliminary results are included that indicate that this method is capable of obtaining the desired particle feature information from the hologram image. Certain limitations of the system are discussed as are possible solutions to these limitations.

Master of Science in
Electrical Engineering
June 1986

Advisor: J.P. Powers
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DESIGN, CONSTRUCTION AND TESTING OF A PROTOTYPE FIN-LINE MAGIC-TEE AND FIN-LINE MONOPULSE SYSTEM SUITABLE FOR MILLIMETER-WAVE APPLICATIONS

James William Rowley
Lieutenant Commander, United States Navy
B.S., California State University, Los Angeles, 1972

This thesis describes a fin-line 180 degree hybrid (magic-tee) that is suitable for use in monopulse radar antennas at microwave and millimeter-wave frequencies.

The three-dimensional junction of a waveguide magic-tee is replaced with fin-line slots, coupled fin-line slots and microstrip lines mounted in a waveguide fixture. The planar geometry on the substrate provides significant reduction in size and eliminates the waveguide ratrace that is associated with conventional hybrids. Ports one and two are flared into fin-line horns to produce a fin-line monopulse system. Suggestions for further development of the fin-line magic-tee and monopulse system are presented.

Master of Science in
Electrical Engineering
December 1985

Advisor: J.B. Knorr
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Engineering

DEVELOPMENT OF A TESTBED FOR MULTISENSOR DISTRIBUTED DECISION ALGORITHMS

Mark A. Schon
Captain, United States Marine Corps
B.S., University of Utah, 1976

Distributed decision problems arise when two or more sensors viewing the same phenomenon must work cooperatively to draw inferences about the observed situation. Typical examples are in target detection and target classification. Such problems are characterized by distributed processing of information and communication between processors over a limited bandwidth data link. This thesis presents some statistical distributed decision algorithms and describes the implementation of one of them on a set of loosely coupled multiprocessor clusters which simulate the distributed environment characterizing multisensor decision problems. The purpose of the implementation was to investigate problems of communication and process synchronization in a pair of processor clusters performing a statistical distributed decision algorithm. This thesis describes how these communication and synchronization problems were addressed and solved.

Master of Science in
Electrical Engineering
December 1985

Advisor: C.W. Therrien
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Engineering

DETECTION AND EXPLOITATION OF VIBRATION INDUCED OPTICAL AMPLITUDE MODULATION

George Robert Scott
Lieutenant, United States Navy
B.S., Jacksonville University, 1979

The remote sensing of surface vibrations on an object via optical methods has many applications. Current techniques use phase coherent methods which are difficult to apply against a noncooperative target, or one at great distances. A simple method of exploiting the apparent amplitude modulation imposed on a light beam reflecting from a vibrating surface is explored. This method requires no phase reference between source and detector, and can use reflected sunlight as its sensor beam. The design and construction of an experimental receiver is presented, and its sensitivity against targets of varying reflectivity, specularity, and mechanical compliance is tested. Impact detection at a distance using this technique is demonstrated, as is identification of the impacted object from its recovered acoustic spectrum. Theoretical range curves are developed, and suggestions for additional uses of the technology are discussed.

Master of Science in
Electrical Engineering
December 1985

Advisor: J.P. Powers
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AN ANALYSIS OF COHERENT AND DIFFERENTIALLY COHERENT DIGITAL RECEIVERS IN THE PRESENCE OF COLORED NOISE INTERFERENCE

Barry L. Shoop
Captain, United States Army
B.S., The Pennsylvania State University, 1980

Optimum receivers for detecting digital signals in additive white Gaussian noise are analyzed when operating in the presence of both white noise and colored noise interference. Modulation schemes, such as coherent M-ary Phase Shift Keying (MPSK), Minimum Shift Keying (MSK), Differentially Coherent Phase Shift Keying (DPSK), M-ary Quadrature Amplitude Modulation (MQAM) and 16-state AM/PM are analyzed. Optimum power constrained colored noise interference spectra are developed for each modulation technique analyzed so as to maximize the receiver error probability.

Receiver performance, quantified by bit and symbol error probabilities is numerically evaluated and graphically displayed as a function of signal-to-noise ratio and interference-to-signal ratio to demonstrate the effectiveness of this interference in terms of receiver performance degradation.

Master of Science in
Electrical Engineering
September 1986

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

DESIGN AND SIMULATION OF AN ULTRA RELIABLE FAULT TOLERANT COMPUTING SYSTEM VOTER AND INTERSTAGE

Virgil K. Spurlock
Captain, United States Army
B.S.E.E., University of Kentucky, 1978

The purpose of this thesis is to design a portion of the hardcore for an ultra reliable fault tolerant computing network. The design focuses on the interstage, the midvalue voter, and the interface to the CPU. The design also investigates the use of the custom slave processor mode of the National Semiconductor 32016-10 CPU as the interface to the interstage. The primary focus of the design is reliability. Therefore the number of gates used is minimized as much as possible. Finally, the entire design is constructed and tested on the Valid Logic Inc. SCALD system computer aided design (CAD) workstation. Effectiveness of the CAD system for large designs is also studied.

Master of Science in
Electrical Engineering
March 1986

Advisor: L.W. Abbott
Department of
Electrical and Computer
Engineering

THE APPLICATION OF BIT SLICE DESIGN TO DIGITAL IMAGE PROCESSING

Morris Bennett Stewart, II
Lieutenant JG, U.S. Coast Guard
B.S., U.S. Coast Guard Academy, 1982

The digital image processing requirements of today's industry are increasing at an astounding rate. With the faster satellite data transmission rates and more frequent data collection periods, both spatial storage and processing speed problems are becoming more prevalent. Digital image processing algorithms must be precise and efficient to meet these needs. This research project studies the implementation of an image smoothing algorithm as a combination of custom tailored hardware and firmware, i.e., using bit slice design.

Bit slice microprocessor design involves the configuration of very fast bit slice devices and the microprogramming necessary to command the hardware to perform a specific task. The result is a high-speed processor, but the price paid is the long and complex design time. Fixed instruction set microprocessor based design is more common but does not permit the same flexibility in hardware configuration or software coding. Hence, the design time is much shorter and less difficult.

The image smoothing algorithm was implemented using both bit slice and microprocessor based design. The bit slice design was performed on Advanced Micro Device's Am29203 Bit Slice Evaluation Board. The board is a 16 bit bit slice microprocessor that allows the user to create and evaluate bit slice microcode. The microprocessor based design was done on a Z-80 based microcomputer.

The bit slice design yielded a much faster system than that of the Z-80 design. The design time for the bit slice system was also much longer and much more complex than that for the Z-80 design. When making a decision as to which type of design to pursue, the dominating factor is usually the cost of the design, namely, the time and difficulty involved.

In the case of digital image processing, however, the algorithms are used many times over and on huge data sets. Therefore, the extra time spent and the complexity involved in bit slice microprocessor design would be rewarded in the form of great savings in execution time when the system is put to use.

Master of Science in
Electrical Engineering
September 1986

Advisor: C.H. Lee
Department of
Electrical and Computer
Engineering

A DEVELOPMENT AND SIMULATION OF SYNERGISTICALLY INTEGRATED RELIABILITY (SIR) FOR AN ULTRA-RELIABLE FAULT TOLERANCE COMPUTER UNDER COMMUNICATION SOFTWARE PROTOCOL FOR THE GROWTH ALGORITHM

Nophadol Sudhamasapa
Lieutenant, Royal Thai Navy
B.S.E.E., Royal Thai Naval Academy, 1979

This thesis describes a C language implementation of a GROWTH ALGORITHM to manage a fault-tolerant computer communication network. Simulation tools are developed to verify and validate the operation of the GROWTH ALGORITHM, and concepts are developed to evaluate the performance of the communication network.

Master of Science in
Electrical Engineering
September 1986

Advisor: L.W. Abbott
Department of
Electrical and Computer
Engineering

PERFORMANCE OF DIRECT BIT DETECTION RECEIVERS FOR MULTIPLE LEVEL PHASE-SHIFT-KEYED MODULATION

Chee Seng Tan
Civilian, Ministry of Defense, Singapore
B.A., Oxford University, 1980

A new receiver algorithm for M-ary Phase-Shift-Keyed modulation is proposed which provides for direct bit detection (DBD) instead of the traditional approach of symbol detection followed by bit regeneration. DBD eliminates the intermediate step of symbol detection and bit regeneration, reduces the amount of computation, allows for binary rather than M-ary decisions, and permits parallel regeneration of bits. All these factors provide an attractive scheme for high speed digital implementation. Receiver structures for DBD of 8-PSK and 16-PSK signals are proposed and the resulting bit error rates (BER) analyzed for transmission over an additive white Gaussian noise channel. In both cases, receiver structures are developed which provide no loss in BER performance when compared to that of conventional phase detection receivers. The proposed receivers' performance was analyzed alongside channel coding techniques. Coding gains of 2.5-5 dB at a BER of 10^{-5} were shown to be feasible with simple block or convolutional codes.

Master of Science in
Electrical Engineering
June 1986

Advisor: D. Bukofzer
Department of
Electrical and Computer
Engineering

A FEASIBILITY STUDY OF A SHIPBOARD COMBAT SURVIVABLE HF ANTENNA DESIGN

James C. Tertocha
Lieutenant, United States Navy
B.S., University of Southern California, 1979

This thesis investigates the feasibility of a shipboard combat survivable HF antenna design. The antenna is modeled as a rectangular volume excited by a square patch atop a monopole centered at one of the volume's faces. Several computer models of the driving antenna are modeled with the Numerical Electromagnetic Code (NEC) and compared. Scale models of the driving antennas are made and their impedance measurements compared to NEC computer models. Input impedances and radiation patterns of the survivable antenna are presented which indicate adequate performance given a 3:1 SWR.

Master of Science in
Electrical Engineering
March 1986

Advisor: R.W. Adler
Department of
Electrical and Computer
Engineering

2-D SIGNAL GENERATION USING STATE-SPACE FORMULATION

Evangelos Theofilou
Lieutenant, Greek Navy
B.S., Greek Naval Academy, 1975

This thesis has dealt with various approaches to modelling 2-D data fields using state-space formulations. Computer simulation of these models has been carried out to generate simulated 2-D data which could then be used for various other signal processing operations. An interesting development that has resulted from this study is that of adaptation of the 1-D SSPACK software package for simulating 2-D linear systems as well as using one of the above state-variable models.

Master of Science in
Electrical Engineering
December 1985

Advisor: S.R. Parker
Department of
Electrical and Computer
Engineering

INTRODUCTION TO THE MICROCOMPUTERS FOR SOLVING RADAR AND ELECTRONIC WARFARE PROBLEMS

Constantinos D. Vergos
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1977

This thesis has been written to solve different types of problems through microcomputers in the radar and electronic warfare field. These problems are offered as subjects at the Naval Postgraduate School in Courses EC 4432/33, EC 4484, and EC 3431.

The computer programs that solve these computer problems have been written in an interactive method because it is user friendly and also so that anyone can change any given parameter or characteristics of radars and jammers and thus study their performance for the purpose of using or designing them.

Master of Science in
Electrical Engineering
December 1985

Advisor: H.A. Titus
Department of
Electrical and Computer
Engineering

MICROPROCESSOR CONTROLLER WITH NONVOLATILE MEMORY IMPLEMENTATION

Jay W. Wallin
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

In support of the Naval Postgraduate School's space program, a small, self-sufficient, low power microprocessor controller with nonvolatile memory has been designed, constructed and tested. Because of limited battery power availability, Complementary Metal-Oxide Semiconductor (CMOS) components have been used. The controller uses the National Semiconductor NSC800 CPU along with three NSC810A RAM-I/O-Timers. Other features include a 16 channel analog-to-digital converter, a real time clock, local memory in the form of EPROM and RAM, and the Intel BPK 72 Bubble Memory System. The general nature of the controller allows it to be reprogrammed and utilized in a variety of applications. Prior thesis research by Captain Mike Snyder, U.S. Army, using the NSC888 Self-Contained NSC800 Evaluation System [Ref. 1] has been expanded upon in this thesis project.

Master of Science in
Electrical Engineering
December 1985

Advisor: R. Panholzer
Department of
Electrical and Computer
Engineering

A FLOWCHARTING SYSTEM AND COMPILER INTERFACE FOR MACPITTS

Elbert L. Weist, Jr.
Major, United States Marine Corps
B.S., California State Polytechnic University (SLO), 1971

The feasibility of a direct FLOWCHART-TO-CHIP concept for the MACPITTS silicon compiler is demonstrated. A graphics package is developed that contains all flowcharting symbols and interconnection systems required for implementation of a MACPITTS compiled finite state machine. This provides the capability for the user's input to MACPITTS to be a graphically generated finite state machine algorithmic flowchart instead of a complex LISP language input file. The SCALD system developed by the VALID corporation provides the required CAD tools. A flowchart to MACPITTS compiler is also developed that demonstrates the validity of the flowchart input concept. Complex flowcharts have been created and successfully compiled into the correct LISP language input file format required by MACPITTS.

Master of Science in
Electrical Engineering
June 1986

Advisors: H.H. Loomis
D.E. Kirk
Department of
Electrical and Computer
Engineering

DESIGN OF A SPACE BASED SENSOR TO PREDICT THE INTENSITY AND LOCATION OF EARTHQUAKES FROM ELECTROMAGNETIC RADIATION

Michael L. Whyms
Lieutenant Commander, United States Navy
B.S., University of New Mexico, 1974

A proposed design for a space based sensor to predict and detect earthquakes is presented. A free standing radio frequency (RF) noise measurement and recording system is described to research the correlation between earthquakes and increased background electromagnetic noise at 30.45 MHz and 150.75 MHz.

Master of Science in
Electrical Engineering
December 1985

Advisor: R.W. Adler
Department of
Electrical and Computer
Engineering

MICROCOMPUTER BASED LINEAR SYSTEM DESIGN TOOL

Roy L. Wood, Jr.
Lieutenant, United States Navy
B.S., Texas A & M University, 1980

The theory, algorithms, and operation of a continuous-time, linear control system design computer program is presented. The program, LCS-CAD, was developed to demonstrate automated transfer function block manipulation in conjunction with such classical control design techniques as Bode, Nyquist, single and two-parameter root locus, and time domain response. Both numeric data and high-resolution graphs are available to the user. The software, which is completely interactive and menu driven, is written in structured Pascal to be run on the IBM-PC microcomputer.

Master of Science in
Electrical Engineering
September 1986

Advisor: G.J. Thaler
Department of
Electrical and Computer
Engineering

MASTER OF SCIENCE

IN

ENGINEERING ACOUSTICS

CONSTRUCTION OF A FIBER OPTIC GRADIENT HYDROPHONE USING A MICHELSON CONFIGURATION

Peggy A. Feldmann
Lieutenant, United States Navy
B.S., United States Naval Academy, 1980

The fabrication and testing of a Michelson interferometric pressure gradient fiber optic hydrophone is described. The ten meter sensing fibers, wound on teflon mandrels, were found to have individual coil sensitivities of .64 $\pm$ .08 rad/Pa in the frequency range of 125 to 560 Hz. This value was a factor of twenty greater than expected based on the elastic properties of the teflon mandrels and this discrepancy is currently under investigation. The differential coil pairs exhibited the typical dipolar directionality pattern and the gradient sensitivity was consistent with the individual coil sensitivities. A discussion of gradient sensor behavior of an unbalanced dipole in both standing and traveling wave fields is included.

Master of Science in
Engineering Acoustics
March 1986

Advisor: S.L. Garrett
E.F. Carome
Department of
Physics

MASTER OF SCIENCE

IN

ENGINEERING SCIENCE

A COMPARISON OF TWO METHODS FOR FIBER DIAMETER MEASUREMENT AND A SYSTEM DESIGN FOR THE STUDY OF COMPOSITE RELIABILITY

Thomas Alvin Bennett
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

This thesis involves the design and construction of an integrated fiber diameter measurement and strength test system for the purpose of conducting a study of the reliability of a composite material. The emphasis of this thesis is placed on the comparison of two methods of fiber diameter measurement using the light diffraction pattern formed by the obstruction of a laser beam by a fiber sample.

Master of Science in
Engineering Science
December 1985

Advisor: E.M. Wu
Department of
Aeronautics

MEASUREMENT OF THE ACOUSTIC PRESSURE EVERYWHERE OVER A MODELED CONTINENTAL SLOPE

John A. Borchardt
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

An image model was used to predict the sound pressure field everywhere within isospeed water overlying a sloping absorbing bottom. All lengths scale with the dump distance, which is the distance from the apex of the wedge to the point where the depth is equal to the minimum uniform depth that can support propagation of the lowest normal mode. Measurements made in a laboratory tank with a 9.5° sand bottom with density and speed of sound 2.0 and 1.1 times those of water showed qualitative agreement with the predictions of the model for receiver distances up to 10 dump distances from the apex and 50 dump distances along the shore.

Master of Science in
Engineering Science
December 1985

Advisor: J.V. Sanders
Department of
Physics

MODELLING OF A MULTILEVEL SECURE TACTICAL COMBAT COMPUTER SYSTEM

Claudio Augusto Bailly Andersen Cavalcanti
Lieutenant Commander, Brazilian Navy
B.S., Escola Naval, 1970

This work is an analysis of the use of a multilevel secure computer system to execute tactical combat applications programs. Using the Gemini Trusted Multiple Microcomputer Base, currently under evaluation by the Department of Defense Computer Security Center, applications and test programs were written and implemented in order to expose some characteristics of the system.

Using a Janus/Ada compiler with the necessary library alterations for the Gemini machine, a simple weapons application program was implemented in a system designed to simulate a tactical environment where classified material can be handled in spite of the different levels of security held by the operators that can access the system.

The loss in performance due to the secure operating system's overhead is estimated in order to establish the tradeoffs in performance gains due to parallel processing capability of the multiprocessor system.

Master of Science in
Engineering Science
June 1986

Advisor: U.R. Kodres
Department of
Computer Science

APPLICATION OF ARTIFICIAL INTELLIGENCE TO IMPROVE AIRCRAFT SURVIVABILITY

William Leecraft Decker
Lieutenant, United States Navy
B.S., Oregon State University, 1978

The hazards associated with the critical flight phases of civil as well as military flight operations can seriously degrade pilot efficiency, and therefore aircraft survivability, if the number of complexity of tasks that the pilot must manage exceeds his/her capabilities. This thesis explores the feasibility of applying artificial intelligence (AI) research to the construction of a Survivability Manager (SM) knowledge based system (KBS) that will assist the pilot by assuming a portion of the survivability task management load. The application of KBS principles to survivability management is illustrated using the normal and emergency management procedures for a hypothetical engine fuel supply system as a working example. Though the SM is not a reality today, there is considerable research in both AI and survivability ennancement studies to draw upon. It is recommended that a prototype be developed using currently available assets to further investigate the feasibility of the Survivability Manager.

Master of Science in
Engineering Science
December 1985

Advisor: R.E. Ball
Department of
Aeronautics

EFFECT OF CHROMIUM ADDITION TO THE LOW TEMPERATURE HOT CORROSION RESISTANCE OF PLATINUM MODIFIED ALUMINIDE COATINGS

Mark W. Dust
Lieutenant, United States Navy
B.S., Georgia Institute of Technology, 1977

Marine gas turbines face many adverse conditions such as reduced fuel quality and a salt environment which present the sulfur, chloride, and sulfates required to initiate and propagate hot corrosion. A particularly severe type of hot corrosion is low temperature hot corrosion (LTHC) encountered at the low temperatures (600-750°C) used for low power destroyer operations. Platinum-aluminides have demonstrated great success as protective coatings which delay the onset of high temperature hot corrosion attack (800-1000°C) . Chromium is known to provide good LTHC resistance. The effect of chromium addition to platinum-aluminide coatings was investigated using two different nickel-base superalloys, IN-738 (16% Cr) and IN-100 (10% Cr).

Master of Science in
Engineering Science
December 1985

Advisor: D.H. Boone
Department of
Mechanical Engineering

AIDING COMPUTER APPLICATION PROGRAMMERS AND USERS WITH THE TOOLS OF THE VISUAL INTERFACE

Michael Nels Fredericksen
Lieutenant, United States Navy
B.B.A., James Madison University, 1978

The purpose of this thesis is to explicate the benefits of the computer visual interface by identifying the functional capabilities of some of the visual devices made possible by such an interface, and by examining the ways in which these visual devices can provide tools to aid the programmer in writing, debugging, and unit testing application programs, and the user in learning and using applications. This thesis should give the reader some insight into how current visual technology is being used (or can be used in the future) to aid the applications programmer and application user. The focus will primarily be on the programmers and users of applications for low-cost desktop computers.

Master of Science in
Engineering Science
March 1986

Advisor: G.H. Bradley
Department of
Computer Science

PARTICULATE SIZING IN A SOLID PROPELLANT ROCKET MOTOR USING LIGHT SCATTERING TECHNIQUES

Kevin G. Horton
Captain, Canadian Armed Forces
BENG, Royal Military College of Canada, 1980

An experimental investigation was conducted to determine the feasibility of introducing particles of a known mean diameter into a small solid propellant rocket motor and measuring the change in mean diameter across the exhaust nozzle. Light scattering profiles at small forward angles were recorded at the entrance and exit of the nozzle. The propellant utilized was nonmetallized and contained HTPB and ammonium perchlorate. Promising results were obtained for injections of polydispersions of glass beads and aluminum oxide particles.

Master of Science in
Engineering Science
June 1986

Advisor: D.W. Netzer
Department of
Aeronautics

AN INVESTIGATION INTO THE EFFECTS OF FUEL ADDITIVES AND FUEL COMPOSITION ON SOOT PARTICLE SIZE IN A T63 GAS TURBINE COMBUSTOR USING LIGHT TRANSMITTANCE AND SCATTERING TECHNIQUES

Ching Hua Jway
Captain, Republic of Singapore Navy
Dipl., Singapore Polytechnic, 1974

An experimental investigation was conducted to examine the effects of fuel-air ratios, fuel composition and smoke-suppressant fuel additives on the sooting characteristics of a T-63 combustor. Multiple wavelength light transmission and two-angle light scattering measurements were used to measure the mean soot diameter. Ferrocene, 12% Cerium Hex-Cem and USLAD 2055 were found effective in reducing exhaust gas opacity. Initial results were conflicting on the cause for the reduced opacity.

Master of Science in
Engineering Science
June 1986

Advisor: D. Netzer
Department of
Aeronautics

[N AND ANALYSIS OF DISCRETE LATERAL AUTOPILOTS FOR
COORDINATED BANK-TO-TURN MISSILES

Christos I. Karadimas
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1976

This thesis addresses the design and analysis of discrete lateral autopilots for application to BTT missiles.

The first part reviewed the classical design and analysis of the continuous uncoupled yaw and roll channels as developed in [Ref. 6]. Then, applying analog-to-digital conversion, the corresponding discrete autopilots were designed and analyzed in terms of their transient responses.

The second part utilized modern control design techniques for the single-input discrete lateral autopilots. At first, assuming availability of all states for feedback purposes, a discrete state-feedback autopilot was obtained. Next, since the state vector is not always available to direct measurement, as estimator was introduced to implement control. The state-feedback and estimator designs were analyzed for both lateral channels and found to have satisfactory time responses.

Finally, coupling the discrete pitch and roll channel autopilots, a state-feedback and estimator were designed and found to be robust.

Master of Science in
Engineering Science
December 1985

Advisor: D.J. Collins
Department of
Aeronautics

THE EFFECTS OF DIGITAL CONTROL ON LONGITUDINAL AUTOPILOTS FOR BANK-TO-TURN AND SKID-TURN MISSILES

Ioannis C. Karaiskos
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1977

This work addresses the design and analysis of the discrete longitudinal autopilot for application to the bank-to-turn (BTT) missiles.

In the development the classical design and analysis were reviewed using the continuous uncoupled pitch channel autopilot for circular airframe. Then, applying analog-to-digital conversion, the corresponding discrete autopilot was designed. The performance of both continuous and discrete open loop systems was analyzed according to the desired requirements.

In the following section, utilizing modern control design techniques for the discrete pitch channel autopilot, the control law was designed, assuming availability of all the states and taking the desired poles to be at the same place as in the classical design. Therefore the discrete state-feedback autopilot was obtained and analyzed. The next step was the design of an estimator which estimates the entire state vector, given measurements of the portion of the state. The performance of the estimator was analyzed too.

Finally, coupling the discrete pitch and roll channel autopilots, the overall performance of the discrete system was obtained and analyzed. The resulting design was also proved to be robust.

Master of Science in
Engineering Science
December 1985

Advisor: D.J. Collins
Department of
Aeronautics

EFFECTS OF VARIATION OF INDEX OF REFRACTION OF ATMOSPHERE ON CERENKOV RADIATION

Kyung Ro Joo
Major, Korean Army
B.S., Dong-a University, 1982

Cerenkov radiation is calculated for electron beams which exceed the velocity of light in a nondispersive dielectric medium. The electron beam is assumed to be bunched as emitted from a travelling wave accelerator and the emission region is assumed to be finite.

The direction of emission of the Cerenkov radiation is related to the index of refraction which in turn is related to atmospheric index of refraction. The calculated index of refraction in the atmosphere predicts changes to the Cerenkov radiation pattern and the emission threshold condition.

Master of Science in
Engineering Science
December 1985

Advisor: J.R. Neighbours
Department of
Physics

AN EXPERIMENTAL INVESTIGATION OF COMBUSTION MODULATION TECHNIQUES FOR A SOLID FUEL RAMJET

Stephen R. Lowe
Lieutenant, United States Navy
B.S., Auburn University, 1978

An experimental investigation was conducted to examine the effects of inlet air swirl and secondary gas injection on the combustion properties in a solid fuel ramjet. Tests were conducted with both HTPB and PMM fuels in order to obtain general results. The swirl tests were conducted at high and low air mass fluxes with equivalence ratios less than unity. Swirl was found effective for increasing the fuel regression rate but the magnitude was highly dependent upon motor geometry, fuel type and operating environment. The gas injection tests included hydrogen at low equivalence ratios, and nitric oxide and nitrous oxide at high equivalence ratios. Secondary injection generally resulted in increases in combustion pressure in agreement with equilibrium, adiabatic combustion expectations.

Master of Science in
Engineering Science
June 1986

Advisor: D.W. Netzer
Department of
Aeronautics

CERENKOV RADIATION: TIME DEPENDENT B FIELD OVER A FINITE PATH

Kathleen Marie Lyman
Lieutenant Commander, United States Navy
B.A., Fordham University, 1970
M.S.T., Fordham University, 1974

This preliminary study investigated the magnetic field radiated from a passing charge bunch traveling over a finite path. Beginning with the infinite path case for a ramp front charge distribution, limits were derived to solve for the magnetic radiation field over a finite path. Radiation pulses were computed and graphed for many different positions of an observer with respect to the beam line. Comparisons of results show that the similarity in pulse shapes does not depend exclusively on the observer's position with respect to the Cerenkov region, but also on certain time conditions in each case.

Master of Science in
Engineering Science
June 1986

Advisor: J.R. Neighbours
Department of
Physics

PLASTIC INSTABILITY OF ALUMINIDE AND PLATINUM MODIFIED DIFFUSION COATINGS DURING 1100°C CYCLIC TESTING

Thomas F. Manley, II
Captain, United States Marine Corps
B.S., Virginia Military Institute, 1979

Platinum modified and unmodified aluminide diffusion coatings, on a nickel base superalloy (IN-738), were prepared to test the pre-aluminizing surface roughness effect on coating oxide scale adherence. A preliminary study of coating microstructure and surface structure changes during cyclic oxidation at 1100°C was begun. During this testing, significant surface deformation described as rumpling was observed and attributed to plastic instability produced during the cycling. Rumpling is found to be a function of the number and type of thermal strain cycles, thermal expansion mismatch, coating strength, and coating thickness. The role of oxide adherence observed for the Pt modified coatings cannot be determined from the data. Previous mention of this effect was not found in the literature. A similar surface rumpling phenomena, however, has been observed in overlay coating systems under similar conditions. The mechanical and protectivity impact of rumpling can only be inferred due to the limited available data.

Master of Science in
Engineering Science
December 1985

Advisor: D.H. Boone
Department of
Mechanical Engineering

INFRARED BACKGROUND AND TARGET MEASUREMENT

Alexander Manolopoulos
Lieutenant, Hellenic Navy
B.S., Hellenic Naval Academy, 1976

The present work describes measurements of IR background radiance. To provide background radiance values for the development of the AN/SAR-8 (IRSTD) system, the radiance of clouds and buildings was measured using the AGA Thermovision 780. The measurement values given in Isotherm Units (photon flux equivalent) were translated into radiance values (W/cm^2sr). The emissivity of the different objects was also computed for the 8-14μm window assuming that their emissivity in the 3-5.6μm band is close to that of a blackbody. The average radiance of clouds was found to be 3.302×10^{-4} W/cm^2sr in the 3-5.6μm window and 3.544×10^{-3} W/cm^2sr in the 8-14μm window. The corresponding values for buildings were 3.587×10^{-4} W/cm^2sr and 4.552×10^{-3} W/cm^2sr respectively.

Master of Science in
Engineering Science
December 1985

Advisor: A.W. Cooper
Department of
Physics

AN INVESTIGATION OF B.T.T. MISSILES

Nicolaos G. Protonotarios
Lieutenant Commander, Hellenic Navy
B.S., Hellenic Naval Academy, 1973

The purpose of this thesis is to examine the control deficiencies in a Bank-to-Turne (BTT) cruise missile, due to specific impairments at its control surfaces, during the intermediate phase of its mission.

A linearized mathematical model is developed, which simulates the dynamic response of the missile, circular airframe, for the study of flight control configuration.

In the development, a classical design and analysis was performed using both, longitudinal and lateral channels for the circular airframe.

For each channel, the control surfaces were split into independent components, and the corresponding continuous open loop uncoupled autopilots were analyzed in terms of their transient response.

Then specific kinds of impairments were examined and analyzed.

Finally, the combined continuous pitch and roll channel autopilots are investigated and the robustness of the complete system is analyzed in Chapter V.

Master of Science in
Engineering Science
June 1986

Advisor: D.J. Collins
Department of
Aeronautics

PARAMETRIC ANALYSIS OF COMBUSTION OF POROUS MEDIUM

Antonio Carlos de Souza Serapiao
Major, Brazilian Air Force
B.S., Instituto Technologico de Aeronautico, 1977

A computer program for a transient one-dimensional mathematical model of combustion in porous medium was used to investigate the effects of several parameters on system behavior. Results show the effects of medium thickness, permeability and reaction order on combustion. In addition, the effect of heat input on combustion was also studied.

Master of Science in
Engineering Science
December 1985

Advisor: D. Salinas
Department of
Mechanical Engineering

EFFECTS OF PULSE SHAPING ON CERENKOV RADIATION

Kenneth Merritt Stein
Lieutenant Commander, United States Navy
B.S., Pennsylvania State University, 1973

Pulse shaping of periodic relativistic electron pulses generates patterns of Cerenkov radiation distinctive of the distribution of charge within a bunch. Computer simulation mapped the radiation pattern of the level, triangular, trapezoidal, rounded, Gaussian, level plus sinusoidal ripple, and multiple hump charge distributions. Each shape, with exception of the level plus sinusoidal ripple, generates a series of radiation patterns unique to that shape. This research provides a basis for determining the shape of a current pulse based on the radiated energy pattern.

Master of Science in
Engineering Science
June 1986

Advisor: J.B. Neighbours
Department of
Physics

TOWARD HIGHLY PORTABLE DATABASE SYSTEMS: ISSUES AND SOLUTIONS

Albert Wong
B.S., West Coast University, 1966

The multi-backend database system (MBDS) is a database system of two or more processors and their dedicated disk subsystems. One of the processors serve as a controller. The rest of the processors and their disks serves as backends to provide the primary and parallel database operations. User access to the MBDS is accomplished either via a host computer which in turn communicates with the controller, or with the MBDS controller directly. This thesis is aimed to examine the portability of MBDS. By downloading the MBDS software from the configuration of VAX and PDP hardware and VMS and RSX operating systems to the configuration of the 32-bit microprocessor-based ISI hardware and UNIX operating system, we hope to determine the necessary amount of hardware-and-operating-system-dependent modifications and reinstrumentations in order to make the downloading successful. The ultimate goal of the thesis is to recommend to the future database-system designer the way to minimize the amount of configuration-dependent software and to strive for a truly and highly portable system to be used on various configurations. This thesis has identified three major portability issues and provided solutions to them. They are the multiple-record template support, the interprocess communication via broadcasting, and the disk I/O for the real-time access.

Master of Science in
Engineering Science
June 1986

Advisor: D.K. Hsiao
Department of
Computer Science

HOLOGRAPHIC INVESTIGATION OF SOLID PROPELLANT COMBUSTION IN A THREE-DIMENSIONAL MOTOR

Sang Chu Yoon
Major, Korea Air Force
B.S., Korea Air Force Academy, Seoul, 1977

An investigation was conducted to determine the feasibility of obtaining holographic recordings of particulate behavior during the combustion process of solid propellant in a three-dimensional, windowed rocket motor.

Transmittance measurements through the combustion chamber were made in order to select the appropriate neutral density filters which would yield the proper scene beam to reference beam intensity ratio. Holographic recordings were successfully made at combustion chamber pressures up to 185 psia using an HTPB-AP propellant containing 2.0 percent aluminum and 0.25 percent Fe_2O_3.

Master of Science in
Engineering Science
December 1985

Advisor: D.W. Netzer
Department of
Aeronautics

MASTER OF SCIENCE

IN

HYDROGRAPHIC SCIENCES

TEXAS INSTRUMENTS 4100 GPS POSITIONING SOFTWARE

Kevin T. Brown
Cartographer, Defense Mapping Agency
B.A., University of North Carolina, 1982

The Hydrographic Sciences Group of the Naval Postgraduate School's Department of Oceanography has a goal to establish and continue a research base related to the Global Positioning System (GPS). To meet this goal a library of programs capable of reducing GPS satellite data to position and time solutions, independent of the receiver's navigation solution, is being acquired.

This thesis describes the modification, documentation, and establishment of Texas Instruments 4100 GEOSTAR GPS software written by the Naval Surface Weapons Center for their CDC Cyber 865 computer, so that it will run on the IBM 3033 computer at NPS. Position and time solutions for either a static or dynamic receiver can be achieved using this software.

Master of Science in
Hydrographic Sciences
September 1986

Advisor: M. Kumar
Department of
Oceanography

APPLICATION OF MULTIPLE LINE OF POSITION FOR HYDROGRAPHY

Samuel P. De Bow, Jr.
Lieutenant, National Oceanic and Atmospheric Administration
B.S., Drexel University, 1976

Conventional near-shore large-scale hydrographic surveys use only two lines of position (LOPs) for position fixing. Previous works have proved that accuracies needed to meet the present International Hydrographic Organization standards are frequently not achieved using conventional surveying methods. The concept of using multiple lines of position (MLOP) adjusted by the least squares method was described. Actual field measurements acquired in the autumn of 1984 were processed to ascertain the increase in accuracy using MLOP versus conventional two LOPs on each hydrographic position. Recommendations are to use a four-range fully automated position-fixing method to increase production, improve data quality, and have better control of the survey operations.

Master of Science in
Hydrographic Sciences
March 1986

Advisors: N.K. Saxena
G.R. Schaefer
Department of
Oceanography

PRELIMINARY STUDIES OF A TECHNIQUE FOR MEASURING THE VOLUME BACKSCATTERING FROM SEDIMENTS

Federico R. Diaz
Lieutenant, National Oceanic and Atmospheric Administration
B.S., University of Texas at El Paso, 1977

An experimental study was performed to devise a technique for measuring the volume backscattering from sediments. This experimental technique has never been performed in the laboratory. The volume backscattering was to be determined by comparing the echoes returned from the sediment with the echo returned from the water/air interface. Measurements made on echoes returned from the water/air interface indicated that the apparatus, data acquisition system, and analysis system were performing correctly. Two types of sediments (fine sand and aggregate gravel) were used. The fine sand did not produce measureable volume backscattering and the aggregate showed results that depended on the region of sediment ensonified. It is recommended that a sediment more homogeneous than the aggregate, but with more backscattering than the fine sand be used in future studies.

Master of Science in
Hydrographic Sciences
September 1986

Advisors: J.V. Sanders
A.B. Coppens
Department of
Physics

BASE-LINE CALIBRATIONS OF THE MINI-RANGER III AND THE ROLE OF SIGNAL STRENGTH IN CORRECTING REAL-TIME HYDROGRAPHIC POSITION DATA

Bruce F. Hillard
Lieutenant, National Oceanic and Atmospheric Administration
B.S., San Diego State University, 1976

Five base-line calibrations of the Motorola Mini-Ranger III (MRS III) shortwave positioning system were performed across Puget Sound, Washington, in January 1984. Two MRS III codes were calibrated over measured distances of 1061.2, 2417.5, 4083.1, 7016.8, and 9861.1 meters. Reference lengths were obtained to submeter accuracy using a Tellurometer, Model CA-1000.

Results of the data analysis suggest that an optimum base-line length of about 2,500 meters provides a characteristic calibration curve that adequately depicts all equipment configurations for a typical MRS III. The calibration curve was best characterized by high-gain antenna data for two Mini-Ranger codes. The high-gain antenna also exhibited the least sample deviation of the three antenna types calibrated. Range average was found to be insignificant. Regression curves applied to the data showed no change in quality of fit above a power of three and variances of 0.5 meters indicated a fair to good fit of the data.

Master of Science in
Hydrographic Sciences
June 1985

Advisor: G.R. Schaefer
Department of
Oceanography

TRAVERSE ADJUSTMENT

Supote Klangvichit
Lieutenant, Royal Thai Navy
B.S., Royal Thai Naval Academy, 1980

A traverse is a series of consecutive lines whose lengths and directions have been determined from field measurements. It is chiefly used to determine the mutual location of survey lines and station positions.

Data reduction procedures have been applied to reducing slope distances to ellipsoidal distances to grid distances. Traverse computations were then performed in universal Transverse Mercator grid coordinates. The computations included adjustment by the method of approximation and by the method of least squares observation equations. Three resection points adjacent to the traverse line were used to analyze the quality of the results. Adjusted traverse coordinates obtained by various methods were compared. The best results were obtained by the least squares method with selected weights incorporated for each observation.

Master of Science in
Hydrographic Sciences
September 1986

Advisors: M. Kumar
G.R. Schaefer
Department of
Oceanography

RELATIVE POSITIONING OF OCEAN BOTTOM BENCHMARKS

Feng-Yu Kuo
Lieutenant Commander, Republic of China Navy
B.S., Chinese Naval Academy, 1976

A sea floor benchmark experiment was conducted in an area about 16 nmi west of Pt. Lobos, California (36°30'N x 122°17' W) during 18-22 May 1985.

Two baseline-crossing methods were used to determine the relative positions of acoustic bottom transponders. The method of least-squares adjustment was used to analyze the data. Relative position determination of the transponder array is discussed and recommendations are made for further improvement. The advantage of these methods is their simplicity. Their disadvantage is the relatively large amount of ship time they require to achieve acceptable accuracies.

Transponder arrays such as the one deployed can be used for solving many types of problems in sea floor engineering, which will be of increasing importance in the future.

Master of Science in
Hydrographic Sciences
December 1985

Advisors: N.K. Saxena
S.P. Tucker
Department of
Oceanography

MASTER OF SCIENCE

IN

INFORMATION SYSTEMS

SOFTWARE REQUIREMENTS SPECIFICATION FOR AN AMMUNITION MANAGEMENT SYSTEM

Robert B. Alderman
Lieutenant Commander, Supply Corps, United States Navy
B.S., University of Virginia, 1976

This thesis concerns the software requirements necessary to automate the present manual effort associated with ammunition inventory management and reporting at the afloat end-user level. Functional characteristics for the application software are developed, program and data structures are proposed, and possible sources of data are identified.

The end-product of this research is the software requirements specification. This document supports further design development of the application software and is independent of programming language and system hardware configuration. The basic format satisfies the provisions of ANSI/IEEE Standard 830-1984.

Master of Science in
Information Systems
September 1985

Advisor: B.A. Frew
Department of
Administrative Sciences

DEFINITION AND DESIGN OF A CASUALTY ASSISTANCE INFORMATION SYSTEM FOR THE UNITED STATES MARINE CORPS

Nancy Pachuta Anderson
Major, United States Marine Corps
B.S., Virginia Polytechnic Institute, 1973

This thesis encompasses the documentation required for the Definition and Design phase of the Life Cycle Management for Automated Information Systems. The documents were produced as a result of a requirements analysis conducted for the Casualty Section of Headquarters, U.S. Marine Corps in Arlington, Virginia during 1984 and 1985. The analysis prompted the decision-makers to authorize continued development of an automated system to support personnel casualty reporting, notification, assistance and recording for the U.S. Marine Corps. The results of the Definition and Design phase will be used to initiate the Development phase of this system.

Master of Science in
Information Systems
March 1986

Advisor: T. Bui
Department of
Administrative Sciences

DESIGN AND IMPLEMENTATION OF A PERSONNEL DATABASE SYSTEM FOR INDONESIAN NAVAL OFFICERS

Djoko M. Ariyadi
Major, Indonesian Marines
B.S., Indonesian Naval Academy, 1969

The objective of this thesis is to provide a software tool to support the Deputy Chief of Staff for Personnel and Staff Function of the Indonesian Navy in making decisions with fast, timely, relevant, up-to-date and accurate information regarding Personnel Management activities.

A database design is proposed including the logical and physical phases and an implementation of a personnel database prototype is undertaken on a microcomputer using dBase II.

Master of Science in
Information Systems
June 1986

Advisor: D.R. Dolk
Department of
Administrative Sciences

AN EVALUATION REQUIREMENTS ANALYSIS, AND A PROPOSED INFORMATIONAL ARCHITECTURAL DESIGN WITHIN THE MANUFACTURING ENVIRONMENT OF "NORTHERN CALIFORNIA ELECTRONICS" (NCE)

Alyce Louisa Austin
Computer Specialist, Department of the Navy
B.S., Naval Postgraduate School, 1981

Michael Owen Kasselman
Major, United States Army
B.A., Lake Superior State College, 1974

This thesis describes the computer resources of a defense contractor and the informational needs within the manufacturing environment of their organization. Since the company wishes to maintain their anonymity, it is referred to as "Northern California Electronics" (NCE). Research is conducted through a series of interviews with department heads and support personnel, observation of work processes, and the examination of current periodical literature and texts. The thesis includes an informational requirements analysis, a proposed informational architectural design, identification and definition of requirements specifications and a description of information systems strategic planning.

Master of Science in
Information Systems
September 1986

Advisor: D.R. Dolk
Department of
Administrative Sciences

CONCEPT DEVELOPMENT FOR THE DEFENSE MANPOWER DATA INTERFACE SYSTEM

John P. Barrett, Jr.
Major, United States Marine Corps
B.S., State College of New York at Plattsburg, 1974

Henry H. Slack, III
Captain, United States Marine Corps
B.A., University of Illinois, 1975
M.B.A., National University, San Diego, CA 1979

This thesis documents a concept development conducted for MPI-40 HQMC. It follows the requirements for concept development as outlined in Marine Corps Order (MCO) P5231.1, Life Cycle Management for Automated Information Systems (LCM-AIS). The concept developed during the course of the thesis was a means of improving procedures used by the Marine Corps for reporting data to the DEERS data base.

The documents produced were those required by MCO P5231.1 for a concept development, they are a Mission Elements Need Statement (MENS), Requirements Statement, Feasibility Study, and Economic Analysis.

This thesis recommends that a dedicated on-line link be created between the Marine Corps Data Network (MCDN) and the DEERS data base to transfer dependent data to DEERS. The thesis also recommends a link be established between MCCDPA and DMDC to transfer sponsor data daily.

Master of Science in
Information Systems
March 1986

Advisor: N.F. Lyons
Department of
Administrative Sciences

A DATA DRIVEN DECISION SUPPORT SYSTEM (DSS) GENERATOR FOR THE EGYPTIAN PROCUREMENT OFFICE IN FOREIGN COUNTRIES

Mohamed H. Bassyouni
Colonel, Egyptian Armed Forces
B.S., Military Technical College, 1969

This thesis focuses on the development of a data-driven decision support system to assist the Egyptian procurement activities in foreign countries. The Egyptian Procurement Office in Washington D.C. (POW) is taken as an example to apply this research. Two areas of procurement type have been examined in POW: the Commercial Procurement, and the Government Procurement activities. The later type is based on the USA Foreign Military Sales (FMS) system. The Data Flow Diagram technique has been used to analyze the system. PC/FOCUS has been used to design a prototype software for the POW Commercial Procurement subsystem to use in an IBM-XT or IBM- AT or compatible microcomputers.

Master of Science in
Information Systems
June 1986

Advisors: D.R. Dolk
T.X. Bui
Department of
Adminstrative Sciences

DEVELOPMENT OF AN AUTOMATED MICRO-COMPUTER KNOWLEDGE-BASED INTEGRATED CONFIGURATION MANAGEMENT SYSTEM FOR THE STOCK POINT LOGISTICS INTEGRATED COMMUNICATIONS ENVIRONMENT (SPLICE) PROJECT MANAGEMENT STAFF

Robert L. Beard, III
Lieutenant Commander, Supply Corps, United States Navy
BE CS, University of New Mexico, 1975

This thesis documents the development of a micro-computer knowledge-based integrated configuration management system for use by Naval Supply Systems Command (NAVSUP) Stock Point Logistics Integrated Communications Environment (SPLICE) Project Staff. A myriad of configuration heuristics associated with the configuration of a SPLICE site are identified. It also provides SPLICE project staff personnel a more accurate, reliable and efficient method of performing the configuration process and managing the overall project.

The development of this integrated configuration management system employs both a prototype and software engineering methodology. The integrated configuration management system will be developed using custom generated software and the logical integration of several off-the-shelf commercial software packages.

Master of Science in
Information Systems
March 1986

Advisors: N.R. Lyons
B.A. Frew
Department of
Administrative Sciences

THE AS FINANCIAL REPORTING SYSTEM: SOME EXPERIENCE ON PROTOTYPING AND USER INTERACTION

Ronald Lloyd Booker
Captain, United States Marine Corps
B.S, United States Naval Academy, 1977

Adaptive design or prototyping has been suggested as an effective approach for developing and implementing computer-based decision support systems (DSS). The literature on DSS has also shown that adaptive design improves user involvement and satisfaction. This thesis attempts to follow the adaptive design approach to design and implements a data-oriented DSS -- the NPS Department of Administrative Sciences (AS) Database Reporting System. The development of the AS Reporting System has helped review the adaptive design strategy. The following findings are derived:

- Close participation between end user(s) and the system builder helps to clarify problem issues.

- Frequent brief interactions between end user and system developer provide more immediate and better defined response, resulting in a more effective prototype.

- Unstructured initial planning sessions involving the end user and the system builder could distract the end user from the definition of important initial requirements. A more structured, issue-oriented approach results in more timely and clearly defined requirements.

- User feedback is less intense and critical towards the final phase of the development process.

- Prototyping is cost-effective, at least for the first phases of system enhancements.

- Prototypes are disposable systems.

Master of Science in
Information Systems
March 1986

Advisors: T.X. Bui
N.F. Schneidewind
Department of
Adminstrative Sciences

FACILITIES PLANNING FOR A MICRO-COMPUTER LABORATORY FOR THE ADMINISTRATIVE SCIENCES DEPARTMENT AT THE NAVAL POSTGRADUATE SCHOOL

John C. Bouma
Lieutenant, United States Navy
B.S., University of Kansas, 1979

John W. Graveen
Lieutenant, United States Navy
B.S., University of Wisconsin, 1979

As computers are being used to an increasing degree throughout the military services, there is a rising demand for computer arrangements which can take advantage of the power of microcomputers. The high cost of mainframe computers, the complex software they require, and the high cost of that software is making it more attractive to use a network arrangement of smaller computers to do many of the jobs of a single mainframe.

At the Naval Postgraduate School, a microcomputer laboratory is needed, both to supplement the existing computer assets, and to provide the exposure to microcomputers the students must have to be effective as managers of the information systems for which they are responsible.

This thesis performs the facilities planning for a microcomputer laboratory for the Administrative Sciences Department at the Naval Postgraduate School.

Master of Science in
Information Sciences
March 1986

Advisor: N. Schneidewind
Department of
Administrative Sciences

AN INTEGRATION, LONG RANGE PLANNING, AND MIGRATION GUIDE FOR THE STOCK POINT LOGISTICS INTEGRATED COMMUNICATIONS PROJECT

Winston Hamlett Buckley
Lieutenant Commander, Supply Corps, United States Navy
B. A., Michigan State University, 1975

Edward John Case
Lieutenant Commander, Supply Corps, United States Navy
B.A., Kings College, 1974

Strategic planning is receiving increased emphasis in both public and private sector organizations. This increased emphasis has recently been evident in the Naval Supply Systems Command (NAVSUP) which issued its formal Strategic Plan in June 1985.

After issuance of such a plan, organizational components should realign their programs and projects to become in consonance with the corporate plan of action. This thesis analyzes the existing and planned Stock Point Logistics Integrated Communications (SPLICE) Project initiatives in light of the NAVSUP Strategic Plan. The results of these analyses are recommendations which will bring the SPLICE Project application, external system interface, and system migration plans into closer harmony with the NAVSUP Strategic Plan.

Master of Science in Information Systems
March 1986

Advisor: M. Spencer
Department of Administrative Sciences

AN AUTOMATED SYSTEMS AND PROJECT MANAGEMENT SYSTEM FOR HEADQUARTERS, U.S. MARINE CORPS

Richard C. Cavallaro
Major, United States Marine Corps
B.S., The Pennsylvania State University, 1971

The administration of all automated information systems is a task that continues to become increasingly difficult as the numbers and complexity of these systems grow. The Department of the Navy has promulgated regulations dealing with life cycle management of these systems from the mission analysis/project initiation phase through such time that the system is terminated. The resources required to perform this managerial control are no longer adequate without the assistance of automated support.

This thesis will develop a micro-oriented database management system that will enhance and simplify management control of the more than one hundred automated systems currently sponsored by the Manpower Systems Integration Branch at Headquarters, United States Marine Corps.

Master of Science in
Information Systems
March 1986

Advisors: N.R. Lyons
D.R. Dolk
Department of
Administrative Sciences

A SIMULATION MODEL OF ISSUE PROCESSING AT NAVAL SUPPLY DEPOT YOKOSUKA, JAPAN

Michael S. Clift
Lieutenant, Supply Corps, United States Navy
B.A., Oakland University, 1977

A computer simulation program has been written in IBM's GPSS V to model the issue processing functions of U.S. Naval Supply Depot Yokosuka, Japan. The results of simulation experiments that may be conducted with the model can be used by analysts in the Planning Division of the Naval Supply Depot to predict actual Depot performance under conditions of surge demand.

Master of Science in
Information Systems
March 1986

Advisor: F.M. Perry
Department of
Administrative Sciences

MANAGEMENT IMPLICATIONS OF THE USE OF MULTIPLE RETINAL PATTERNS AS A MEANS OF PERSONNEL IDENTIFICATION

Amry Stout Cox
Lieutenant, United States Navy
B.S., University of North Carolina at Greensboro, 1976

A group of 51 adults was studied to determine if multiple patterns improved the overall recognition rates of a selected retinal scan device. The experimental mode was a laboratory simulation of a locking door mechanism controlled via The EyeDentification System 7.5. The study examines single, double, or triple patterns of individual participants over the course of eight weeks to see if any improvement in successful recognition rates could be obtained. After four weeks, the system achieved 100% successful recognition rates over all three groups regardless of the number of templates in memory. No false acceptances were recorded for the experiment. The conclusion drawn from this study was that the use of multiple patterns versus the use of a single eye template reference pattern, with The EyeDentification System 7.5, did not significantly increase the overall success rate of recognition for a given population.

Master of Science in
Information Systems
September 1986

Advisor: G.K. Poock
Department of
Operations Research

A MAGNETIC TAPE LIBRARY SYSTEM FOR THE COMPUTER SCIENCE DEPARTMENT NPGS: REQUIREMENTS ANALYSIS, DESIGN, AND IMPLEMENTATION

Billie Elizabeth Crawford
Lieutenant Commander, United States Navy
B.A., University of Maryland, 1971

This thesis describes the development of a magnetic tape library system (TLS) for the Computer Science Department of the Naval Postgraduate School, Monterey, California. The TLS was developed using the Ingres VM UNIX Version 2.1/15 VE.04 database management system on the 4.2 BSD UNIX operating system. The thesis includes a requirements analysis and design, and a description of implementation.

Master of Science in
Information Systems
December 1985

Advisors: D. Dolk
B. Frew
Department of
Administrative Sciences

COMPUTER TRAINING FOR FINANCIAL MANAGEMENT OFFICERS IN THE MARINE CORPS

Kathryn Elizabeth Crim
Captain, United States Marine Corps
BBA, University of Texas at Austin, 1977

This thesis examines the need for computer training of financial management officers in the Marine Corps. Currently, there is no computer requirement in the financial management training program. In order to determine if a need for computer training exists, a questionnaire was distributed at 28 Marine Corps installations to officers who possess disbursing, accounting, financial management, or financial management specialist military occupational specialties. Forty-nine percent of the officers responded. An evaluation of the computer education and training taken by these financial management officers to meet their computer related responsibilities is provided as well as the identification of microcomputers and software packages in use. The analysis indicates that a need for computer training exists and that formal courses of instruction should be implemented.

Master of Science in
Information Systems
September 1986

Advisors: K.J. Euske
M.P. Spencer
Department of
Administrative Sciences

AN INVESTIGATION OF IBM'S BUSINESS SYSTEMS PLANNING (BSP) AS A SUITABLE METHODOLOGY FOR STRATEGIC INFORMATION SYSTEMS PLANNING FOR THE NAVAL RESERVE

Frederick B. Duckworth
Lieutenant, United States Navy Reserve
B.S., University of Nebraska, Omaha, 1978

This research examines the Naval Reserve organization, information systems (IS) planning, and IBM's Business Systems Planning (BSP) methodology. The Naval Reserve is analyzed in the context of IS planning requirements. The information needs of the organization are examined as well as that organization's current IS planning process. BSP is investigated as an alternate planning methodology. A partial analysis of the Naval Reserve using BSP is used as an illustration of the methodology. It highlights some of the information related complexities and organizational influences that confront the IS planner.

Master of Science in
Information Systems
September 1986

Advisor: M.P. Spencer
Department of
Administrative Sciences

A MECHANIZED DECISION SUPPORT SYSTEM FOR ACADEMIC SCHEDULING

Stephen M. Fenstermacher
Captain, United States Marine Corps
B.S., The Pennsylvania State University, 1977

This thesis documents the mechanization of Computer Systems Management course selection and scheduling. It examines the factors that complicate academic scheduling and reviews the major problems associated with the current system.

Alternative decision support system techniques to consolidate and integrate scheduling data were examined for potential implementation problems. Solutions to those problems became design objectives. The scheduling software was developed using the software engineering methodology. A prototype program was distributed to selected users and the final program was modified based on their feedback.

The program custodian should control the program by making it available through a centralized media such as an electronic bulletin board. Future enhancements to this program should include expansion of the database, conversion to a database language and development of a microcomputer version.

Master of Science in
Information Systems
March 1986

Advisor: N.R. Lyons
Department of
Administrative Sciences

THE DESIGN AND DEVELOPMENT OF A MANAGEMENT INFORMATION SYSTEM FOR THE MONTEREY NAVY FLYING CLUB

Derek R. George
Commander, United States Navy
B.S., Southern Illinois University, 1967

This thesis provides a Management Information System for the Monterey Navy Flying Club. It supplies the tools necessary to enable the club manager to maintain all club records and generate required administrative and financial reports.

Master of Science in
Information Systems
March 1986

Advisors: B.A. Frew
J.W. LaPatra
Department of
Administrative Sciences

A PROTOTYPE MODEL FOR AUTOMATING NURSING DIAGNOSES, NURSE CARE PLANNING AND PATIENT CLASSIFICATION

Gary Richard Harmeyer
Lieutenant Commander, United States Navy
B.S., University of Iowa, 1975
M.A., Webster College, 1981

This project serves as a prototype of an automated nursing care system. The project contains three main components: nursing diagnosis, nursing care plans, and patient classification. The objective of this project is to marry the above three nursing elements into a single integrated system.

The program requires validation for access and patient admission capability. Doctor's orders and nurse's orders comprise major inputs for determining the elements of patient care. Patient care functions carry weighted qualifiers which input to calculate the patient classification.

The project uses dBase III to manage the database functions and Exsys to calculate patient classification.

Master of Science in
Information Systems
March 1986

Advisors: N.R. Lyons
T.X. Bui
Department of
Administrative Sciences

A DECISION SUPPORT PERSONNEL MONITORING DATABASE SYSTEM PROTOTYPE FOR THE UNITED STATES MARINE CORPS

David L. Horton
Major, United States Marine Corps
B.S., Drake University, 1972
M.A., Pepperdine University, 1980

This thesis examines the decision criteria used in monitoring personnel within the United States Marine Corps. Given the decision criteria used in the manual process, a prototype Decision Support Personnel Monitoring Database System is developed using the dBASE III query language. The system is designed to run on a microcomputer and allows the user to add, modify, delete or review all databases. Personnel reports can be generated identifying all officers eligible for a specific billet or all billets that an officer is qualified to fill. This real-time personnel monitoring system is used to assist the personnel monitors in matching vacant job assignments with eligible qualified Marines.

Master of Science in
Information Systems
December 1985

Advisor: D.R. Dolk
Department of
Administrative Sciences

THE CONSTRUCTION OF A LOCAL AREA NETWORK AMONG ROKM HEADQUARTERS (DOD, ARMY, NAVY AND AIR FORCE)

Jee Ho Jeong
Major, Republic of Korea Army
B.S., Korea Military Academy, Seoul, 1977

Tae Gong Lee
Major, Republic of Korea Air Force
B.S.E.E., Korea Air Force Academy, Seoul, 1976

This thesis discusses the design issues and fundamental techniques of a Local Area Network (LAN), and designs and chooses an LAN for the military. The three HQs ano DoD of Korea operate their own computer center with no connection among them. All the exchange of data is performed manually and slowly, but they want to rapidly and accurately exchange information among the fields of logistics, intelligence and operations.

First, this thesis represents an overview of the current system; how the system is organized, how it functions, and what its existing facilities are. The thesis introduces the system objectives; the improvement of combat readiness and office automation. The overview and objectives of the system are utilized as a basis for system analysis. Through the system analysis phase, user's requirements are identified; information production, information transmission and information management. Based on user's requirements, LAN requirements are identified; software information transmitted on the network, security, reliability, interconnection and interfacing. Through requirement analysis, the evaluation criteria for an LAN design are produced and a model of system is explained by using Data Flow Diagram (DFD) and Data Dictionary (DD).

Additionally, the thesis examines the issues for designing an LAN and goes on to select four fundamental technical ingredients. These are

(1) access control method, (2) transmission media, (3) topology, and (4) transmission techniques. Finally, the thesis selects and recommends a military LAN; a single-cable, midsplit broadband system.

Master of Science in
Information Systems
March 1986

Advisors: J.W. LaPatra
T.R. Sivasankaran
Department of
Administrative Sciences

NON-COOPERATIVE GROUP DECISION SUPPORT SYSTEMS: PROBLEMS AND SOME SOLUTIONS

Andre Kardos
Lieutenant Commander, United States Navy
B.S., Florida State University, 1973

Egbert Kutz
Lieutenant, Federal Republic of Germany, Navy
Ing. (grad.), TFH Berlin, 1976

The purpose of this thesis is twofold: (i) to explore some design issues for building group decision support systems for non-cooperation environments, and (ii) to expand CO-OP, a cooperative multiple criteria group decision support system, to support particular classes of group decisions. From the conceptual standpoint, this work argues for that cooperation as a special case of non-cooperation. The following design requirements are proposed: (i) negotiation as a capability within model management, (ii) greater capabilities in database management, and (iii) increased flexibility for the user interface.

The present version of CO-OP has, with this work, implemented the following features: (i) scrolling windows to handle group problems with large size, (ii) code optimization to provide fast feedback to members, (iii) improved heuristics for the Negotiable Alternatives Identifier (NAI), (iv) implementation of the Mediator module, and (v) allowance of more advanced data manipulation to promote data exchange in competitive environments (e.g., data security and sharing). The above implementation has encompassed approximately 6,000 lines of original pascal code, and 3,000 lines of modified code.

Master of Science in
Information Systems
September 1986

Advisor: T.X. Bui
Department of
Administrative Sciences

A RELATIONAL DATA DICTIONARY COMPATIBLE WITH THE NATIONAL BUREAU OF STANDARDS INFORMATION RESOURCE DICTIONARY SYSTEM

Robert A. Kirsch, II
Captain, United States Army
B.S., University of South Alabama, 1973

Data is a very valuable corporate asset. How it is managed and controlled can often determine the success or failure of a corporate venture. With this fact in mind many organizations are taking a close look at what tools are available to help them in this effort.

This thesis takes a look at two types of data management tools available today, the Relational Data Base Management System (DBMS) and the Data Dictionary (DD). It discusses desirable DBMS and DD characteristics with particular attention being paid to the shortcomings of DDs. It also describes the effort of the National Bureau of Standards (NBS) to develop a DD standard and examines in detail the NBS Information Resource Dictionary System (IRDS) and how the standard was implemented in a prototype IRDS.

Master of Science in
Information Systems
December 1985

Advisor: D.R. Dolk
Department of
Administrative Sciences

THE ROLE OF SOFTWARE DEVELOPMENT STANDARDS IN REQUIREMENTS ANALYSIS AND DESIGN

Margaret Queen Lyle
Lieutenant, United States Navy
B.A., College of Great Falls, 1972
M.S., Florida State University, 1973

Software is the most expensive aspect of computer systems. It also has the potential to have the greatest adverse impact on the system. This thesis examines the role of software standards in the early development phases of requirements analysis and design. Both the costs and benefits associated with the use of standards are evaluated. Tools and techniques that support the use of standards are identified and evaluated for use in producing software that is usable and maintainable. Current Navy software development guidelines are identified and evaluated with respect to current industry practices. The analysis indicates that software standards are essential in the development life cycle. Navy guidelines do mandate the use of such standards in the development of mission critical computer software. The importance of frequent reviews and the use of supporting tools and techniques is emphasized.

Master of Science in
Information Systems
September 1986

Advisor: B.A. Frew
Department of
Administrative Sciences

A PROPOSAL FOR A COMPUTER-BASED INFORMATION SYSTEM TO SUPPORT THE PORTUGUESE AIR FORCE WAR COLLEGE (IAEFA)

Joao Alberto Mendes Mascarenhas
Lieutenant Colonel, Portuguese Air Force
M.S. (Licenciate), University of Lisbon, 1976

This thesis applies IBM's Business Systems Planning (BSP) methodology to the design of an information system architecture for the Portuguese Air Force War College (IAEFA).

The current manual system is described identifying each organizational group and the functions each performs. The BSP methodology is also defined including its background, underlying concepts, and potential benefits. The BSP methodology is applied to the Portuguese Air Force War College (IAEFA) resulting in a list of data classes, a process/data class matrix and an information flow diagram.

Master of Science in
Information Systems
March 1986

Advisor: M.P. Spencer
Department of
Administrative Sciences

EXAMINING THE EFFECT OF TRANSVERSE MOTION ON RETINAL BIOMETRIC IDENTIFIERS RELATING TO SHIPBOARD SECURITY MECHANISMS

David Andrew Masiero
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1979

The use of retinal biometric identifiers as security devices in shipboard applications was investigated with the use of the DOT 7.5 (new version) and DAISY 7.5 (old version) scanners of the Eye-Dentify Co. of Beaverton, Oregon. Motion testing was the primary purpose of this thesis. It was the first occurence of dynamic testing on any type of retinal pattern recognition device. A transverse motion (only) simulator that could roll up to fourteen degrees and sustain a cycle per minute (cpm) rate of 6.0 was constructed and utilized. The nature of the experiment was to test the two scanners to determine if there would be significant differences in the characteristics of the two, and their possible uses at sea. Important conclusions were: 1) The best results occured on the DOT 7.5, although five Type II 'RECOGNITION' errors were noted; 2) As period of roll and angle of roll were increased in cpm's and degrees respectfully, results were poorer; 3) Identification threshold settings were allowed to be set too low at +0.60 by the CRT lock manager, and should be raised to approximately +0.70. That way, the probability of the occurance of Type II errors (false RECOGNITIONS/VERIFICATIONS) would be greatly decreased; 4) Retinal scanners are generally very reliable.

Master of Science in
Information Systems
March 1986

Advisor: G. Poock
Department of
Operations Research

AN ANALYSIS OF MINIMUM SYSTEM REQUIREMENTS TO SUPPORT COMPUTERIZED ADAPTIVE TESTING

Brian J. McCormack
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

This paper discusses the minimum system requirements needed to develop a computerized adaptive test (CAT). It lists some of the benefits of adaptive testing, establishes a set of operational constraints, and reviews both software and hardware requirements based on those operational constraints. An experimental CAT system that is currently in use is reviewed in detail.

Master of Science in
Information Systems
September 1986

Advisor: B.M. Bloxom
Department of
Administrative Sciences

SHIPBOARD MICROCOMPUTERS AND THE ADP ACCREDITATION PROCESS

Bruce Edward Nelson
Lieutenant, United States Navy
B.S., University of South Carolina, 1977

The purpose of this thesis is to examine the Department of the Navy ADP system accreditation process as it relates to shipboard microcomputers. The primary reference document, OPNAVINST 5239.1A, is the Department of the Navy Automatic Data Processing Security Program instruction, which details the accreditation process. The accreditation process and limitations of the instruction are discussed.

An alternative method for determining ADP systems safeguards, the baseline security safeguard model used by the U.S. Geological Survey, is evaluated to determine its applicability in the shipboard microcomputer environment. Additionally, the Nelson/DoD model, which uses cost and proved effectiveness as metrics to select c untermeasures, is developed and discussed.

This thesis concludes that a more cost effective means of selecting countermeasures is needed and recommends that the Nelson/DoD model be adopted to accomplish this goal. Suggested further research involves creating a Decision Support System (DSS) by automating the Nelson/DoD model.

Master of Science in
Information Systems
September 1986

Advisor: K.J. Euske
Department of
Administrative Sciences

IMPLEMENTATION AND EVALUATION OF MICROCOMPUTER SYSTEMS FOR THE REPUBLIC OF TURKEY'S NAVAL SHIPS

Sukru Ozkan
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1980

The aim of this thesis is to analyze and design a microcomputer system for Republic of Turkey Navy combatant ships. Most shipboard nontactical information handling operations currently are performed manually aboard Republic of Turkey Naval combatant ships. To perform this nontactical information handling operations efficiently, the development of a microcomputer system onboard RTN ship is presented. Also, microcomputer system design considerations and evaluation method is discussed in this thesis.

Master of Science in
Information Systems
March 1986

Advisor: P.W. Callahan
Department of
Computer Science

A LOCAL AREA NETWORK TO FACILITATE OFFICE AUTOMATION IN THE ADMINISTRATIVE SCIENCES DEPARTMENT

William Howard Peck
Lieutenant, United States Navy
B.A., University of California, Los Angeles, 1979

This thesis explores the implementation of a Local Area Network (LAN) to increase the usefulness of microcomputers in an office environment by linking individual microcomputers and associated peripheral devices together into a communications network. The target site is the Administrative Sciences Department at the Naval Postgraduate School, Monterey, California.

This thesis is not intended to be a text on the technical aspects of LAN engineering. It is intended to help management personnel become familiar with the basic concepts, vocabulary, and resources available so that management can make enlightened decisions concerning LAN design and implementation.

While this thesis focuses on a specific organization, the information is applicable to other organizations that are contemplating an LAN to facilitate office automation.

Master of Science in
Information Systems
March 1986

Advisors: N.F. Schneidewind
M.P. Spencer
Department of
Administrative Sciences

DISTRIBUTED COMPUTER SYSTEMS FOR THE REPUBLIC OF TURKEY NAVY

Haldun Pelit
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1978

The aim of this thesis is to introduce the concept of distributed computer systems to the Republic of Turkish Navy for its new computer system. The new computer system is planned to provide data processing facilities to the commands spread over a 20km area at Golcuk. The main elements (networks, operating systems, file servers) of distributed computer systems are explained as well as the concept. The recommended system is a collection of super minis to which a number of personal computers are connected. A pilot system and a design methodology are described to define and test the system and the user requirements for the new computer system.

Master of Science in
Information Systems
December 1985

Advisor: B. Frew
Department of
Administrative Sciences

AN ANALYSIS OF THE NAVY REGIONAL DATA AUTOMATION CENTER (NARDAC) CHARGEBACK SYSTEM

William Arthur Potter
Lieutenant, Supply Corps, United States Navy
B.S., University of Tennessee, 1975

A data processing chargeback system is one of the most important tools for management control of computer resources. Users are coordinated and controlled through the impact of life cycle budgets and transfer prices on demand for computer products and services. Computer resource decisions concerning configuration and magnitude are also impacted by life cycle prices. This concept is used to explain some current chargeback accounting systems and to provide the foundation for development of preferred chargeback objectives and measurement criteria (or standards). Evaluation of data processing management performance requires setting user understandable criteria. To that end, emphasis must be shifted from a purely inward looking perspective to a "user oriented perspective." Using the initial concept as a foundation, the author leads the reader through a step-by-step process that introduces, develops, and expands the above points and culminates in a suitable environment for this user oriented perspective.

Master of Science in
Information Systems
September 1986

Advisor: C.R. Jones
Department of
Administrative Sciences

DESIGN OF A GENERIC DECISION SUPPORT SYSTEM FOR USE WITH THE FAMIS SYSTEM

Renee Lefebvre Rodeck
Lieutenant, United States Navy
B.A., University of California, 1974

In a national emergency, allocation of scarce communication resources to recovery agents will be vital to recovery efforts. To facilitiate such allocation, the National Security Council is developing the Fly-Away Management Information System (FAMIS).

This thesis discusses the possible characteristics of a decision support system as a needed feature of the FAMIS system.

Master of Science in
Information Systems
March 1986

Advisors: J. LaPatra
M.P. Spencer
Department of
Administrative Sciences

THE DESIGN AND IMPLEMENTATION OF A JOB APPLICATION DECISION SUPPORT SYSTEM FOR THE CIVILIAN PERSONNEL OFFICE

Robert Chaderton Sain
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

The recent purchase of Televideo computer systems for government agencies has enabled them to propose new methods of information management techniques. However, limited assistance is available for designing programs which could be beneficial in performing certain time-consuming functions. This thesis provides a design and implementation for a decision support system which assists the Civilian Personnel Office at the Naval Postgraduate School in providing job vacancy information to prospective employees. In addition, it can provide valuable advancement information to current Federal employees. The program is designed using R:Base 5000 and allows the user the opportunity to provide ongoing recommendations and to customize the program to suit individual office needs. These recommendations can then be incorporated into future versions of the system to enhance its decision support capabilities.

Master of Science in
Information Systems
September 1986

Advisor: B. Frew
Department of
Administrative Sciences

COMPUTERIZED PROJECT MANAGEMENT: HOW TO USE A MACINTOSH TO IMPROVE MANAGER PRODUCTIVITY

Mark Linsly Scire
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1975

Productivity improvement is a key management issue for the 1980's. The purpose of this thesis is to examine how a military manager might use an Apple Macintosh microcomputer, MacProject software, and other assorted peripherials as one method to improve productivity in the project management environment. Data from a manually scheduled military change of command ceremony is automated using MacProject resulting in a 150% planning-time savings of 8 versus 20 hours. The thesis research examines the issue of productivity in general and explains the key factors that contribute to improving and decreasing it. It also discusses project management problems, pitfalls, and solutions. The concept of using standarized, MacProject-based templates to manage typical Coast Guard projects is introduced.

Master of Science in
Information Systems
March 1986

Advisor: R. Evered
Department of
Administrative Sciences

A PROPOSAL FOR A MICROCOMPUTER-BASED PHYSICAL QUALIFICATIONS MONITORING SYSTEM FOR THE BRANCH CLINIC, BANCROFT HALL, ANNAPOLIS, MARYLAND

Richard C. Setzer
Lieutenant, Medical Service Corps, United States Navy
B.S., The George Washington University, 1980

The mission of the Branch Clinic, Bancroft Hall, is to meet the primary health care needs of the Brigade of Midshipmen, U.S. Naval Academy. Equally important, the Branch Clinic must monitor the physical qualifications of those midshipmen and make recommendations to Naval Academy authorities and higher echelon activities regarding their suitability to participate in ongoing professional development activities and for subsequent service as commissioned officers of the Navy and Marine Corps.

This thesis proposes a microcomputer-based Physical Qualifications Monitoring System for the Branch Clinic. Developed as a prototype, the system would provide the clinic staff with their first significant hands-on experience with current information systems technology and serve as a basis for a more fully developed microcomputer-based system or as a preliminary requirements specification for a mainframe-based system.

Master of Science in
Information Systems
March 1986

Advisor: T.R. Sivasankaran
Department of
Administrative Sciences

SNAP-II: A POST IMPLEMENTATION REVIEW OF USER CONCERNS ON SELECTED SHIPS

Henry L. Shotwell
Commander, United States Navy
B.S., University of Richmond, 1967

Patrick J. Mallon
Lieutenant Commander, Supply Corps, United States Navy
B.A., Marquette University, 1972

Christopher E. Wheeler
Lieutenant Commander, United States Navy
B.S., United States Merchant Marine Academy, 1973

This thesis gives a short, concise description of the U.S. Navy SNAP-II (Shipboard Non-Tactical Automated Data Processing Program) computer system, and through a post implementation review of six ships having the system installed, delineates concerns and problem areas with the SNAP-II system as perceived by the end-users. Major areas of concern that emerged are training, documentation, and the role of management in relation to the SNAP-II system, both internal and external to a U.S. Navy ship. An analysis of these issues is conducted and is the basis for recommendation on how to improve the SNAP-II program.

Master of Science in
Information Systems
March 1986

Advisors: N.F. Schneidewind
M.P. Spencer
Department of
Administrative Sciences

AN ANALYSIS OF THE MARITIME TACTICAL SOFTWARE MAINTENANCE MANAGEMENT

B. Wayne Silver
Lieutenant Commander, Canadian Navy
B.S., University of Victoria, 1969

This thesis examines the Canadian Forces Maritime Tactical Software Maintenance organization and its ability to meet the future software maintenance requirements of the fleet. In order to provide new programming managers with a better understanding of Maritime tactical software maintenance, a basic framework for software maintenance is presented, and the major problem areas within the military software maintenance environment are addressed. Software management practices, maintenance techniques and tools, and documentation and testing procedures are all discussed in order to aid the military manager in improving the Maritime software maintenance organization. Based on a better understanding of the life-cycle requirements of software maintenance, and the factors affecting programmer productivity, suggestions for improving the software productivity of the Fleet maintenance organization are discussed. By addressing the problems of the past tactical programming environment and understanding the present technology of software maintenance management, it is hoped that the capabilities of the future Fleet Tactical Programming Center will be greatly improved.

Master of Science in
Information Systems
March 1986

Advisors: C.R. Jones
T.X. Bui
Department of
Administrative Sciences

DEVELOPMENT OF A PROTOTYPE COMPUTERIZED ADVISING SYSTEM FOR STUDENT ACADEMIC PERFORMANCE PREDICTION IN ELECTIVE COURSES

R. Tanju Sirmen
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1980

This thesis pertains to the area of academic performance prediction. Using multiple regression techniques with graduated students' biographical, and academic data; four predictors were successfully discovered, and the prediction model was developed. Especially course content indicated by prerequisite courses, exhibited a strong relationship to elective courses' achievement. The second important predictor was native language.

The findings of the research were also implemented through a prototype computerized system, called CAS (Computerized Advising System). This product of the study may be used to assist students in the selection of elective courses.

Master of Science in
Information Systems
March 1986

Advisor: T R. Sivasankaran
Department of
Administrative Sciences

EFFECTIVE MICROCOMPUTER MANAGEMENT: AN EXECUTIVE LEVEL GUIDE

Michael W. Skahan
Commander, United States Navy
B.S., U.S. Naval Academy, 1970

A major hardware buy of Zenith microcomputers and peripherals was begun by the U.S. Navy in 1983 to equip squadrons, afloat units, and staffs with desktop computer capability. This contract provided considerable savings in hardware aquisition costs and the potential, with proper software, to radically improve the effectiveness of individual commands. This improvement has not been realized in many commands, due mainly to a lack of understanding of what a computer system is, how to ensure effective applications, and how the system should interact beyond the command. This study, aimed at the commanding officer, discusses management of a microcomputer system. It includes basic microcomputer capabilities and limitations, economics considerations, program requirements, training, and recommendations for enhancing microcomputer effectiveness.

Master of Science in
Information Systems
March 1986

Advisors: M.P. Spencer
J.W. LaPatra
Department of
Administrative Sciences

CO-OP 2.0 DISTRIBUTED DECISION SUPPORT SYSTEM FOR STRATEGIC PLANNING

Christos Skindilias
Lieutenant, Hellenic Navy
B.S., Naval Academy of Greece, 1975

This thesis focuses on the implementation and use of a multiple criteria, multiple-user Decision Support System capable of supporting distributed strategic decision-making. An example of the use of such a distributed decision support system for selecting warships for the Hellenic Navy demonstrates tbe usefulness of the proposed group DSS.

Master of Science in
Information Systems
March 1986

Advisor: T.X. Bui
Department of
Administrative Sciences

CHOOSING A MICROCOMPUTER SYSTEM FOR APPLICATIONS IN THE INDONESIAN NAVY

Rachmat Sobandi
Captain, Indonesian Navy
B.E., Naval Electronic School, 1972

Microcomputer technology has grown significantly in the last ten years. Starting from a kit assembled by computer hobbyist, today, microcomputers entered not only the small business, but large corporations as well.

This thesis addresses the contemporary microcomputer system, and the potentialities of using this technology for a number of applications in the Indonesian Navy.

Master of Science in
Information Systems
March 1986

Advisor: N.F. Schneidewind
Department of
Administrative Sciences

IMPLEMENTATION CONSIDERATIONS OF THE BASES AND STATIONS INFORMATION SYSTEM (BASIS) FOR NAVAL SHORE ACTIVITIES

Glenn L. Stampler
Lieutenant, United States Navy
B.A., Rutgers College, 1977

This thesis provides a strategy for use by a Commanding Officer to plan and implement the Bases and Stations Information Systems (BASIS) at a Naval Shore activity. Specific areas discussed include: an overview of why proper information management is essential for a command, the background of why BASIS was developed, a discussion of problem areas encountered by the staff at Mather Air Force Base while implementing a system similar to BASIS, and implementation considerations for a command. Research for this thesis included current readings in the area of design and implementation of automated information systems along with interviews of several ADP Managers and Commanding Officers from San Diego area commands. A result of these interviews was direct insight of the needs and requirements perceived by the local commands to properly implement BASIS.

Master of Science in
Informations Systems
March 1986

Advisor: C R. Jones
Department of
Administrative Sciences

CAESAR: COMMISSIONED ASSIGNMENTS EXECUTIVE SUPPORT FOR THE U.S. ARMY

Paul A. Stipek
Major, United States Army
B.S., United States Military Academy, 1973

The Army officer assignment system, while generally functional, is not optimal, especially with regard to consideration of officer desires and skills. It is feasible to achieve significant improvement through a decision support system that could match position requirements with officer talents and preferences. This system, when supervised by knowledgeable, involved officers, could greatly improve morale and assignment efficiency plus lower some personnel and training costs. This thesis develops a simple prototype for such a system called CAESAR. It uses data that is already available, on a database system that is substantially in place, to aid presently assigned personnel managers place the right man in the right job.

Master of Science in
Information Systems
March 1986

Advisors: D.R. Dolk
T.X. Bui
Department of
Administrative Sciences

A DECISION SUPPORT SYSTEM FOR PLANNING, CONTROL, AND AUDITING OF DOD SOFTWARE COST ESTIMATION

Anne Nell Neely Sullivan
Lieutenant Commander, United States Navy
B.A., University of Kansas, 1973
M.B.A., Bryant College, 1979

James M. Darabond
Lieutenant, United States Navy
B.S., University of Utah, 1978

This thesis takes an overview of past software development estimation problems and practices, surveys the present situation, and provides recommendations. Results from a Department of Defense (DoD) wide survey on software development estimation factors are examined for trends using statistical analysis techniques.

Basic and Intermediate models of the Constructive Cost Model (COCOMO) are implemented using a software engineering approach for development and documentation. This Decision Support System (DSS) is developed as a prototype for possible use in DoD for software development and maintenance estimations. Documentation for this DSS is contained in the appendices.

Master of Science in
Information Systems
March 1986

Advisors: T.X. Bui
N.R. Lyons
Department of
Administrative Sciences

AN ANALYSIS OF FRIENDLY INPUT DEVICES FOR THE CONTROL OF THE NAVAL WARFARE INTERACTIVE SIMULATION SYSTEM (NWISS)

Mark J. Sweeney
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Kenneth J. Bitar
Lieutenant, United States Navy
B.S., Oklahoma City University, 1977

This thesis describes an experiment conducted at the Naval Postgraduate School (NPS) during the period 15 October 1985 through 28 October 1985. Specifically, the experiment evaluates "pull-down window" microcomputer technology, continuous speech recognition equipment, and standard computer keyboard entry to input commands in a command and control environment. Using the Naval Warfare Interactive Simulation System (NWISS) as a controlled medium, military problems were posed to test subjects in specific light and noise environments.

Although the results are not entirely conclusive, they do demonstrate a distinct advantage in using continuous speech or keyboard entry modes over the drop-down window technology of the Macintosh (if subject training time is not a significant restriction). Either the continuous speech, or the keyboard method was clearly superior in all environments.

Master of Science in
Information Systems
March 1986

Advisor: J.S. Stewart
Department of
Operations Research

N.J. Lyons
Department of
Administrative Sciences

HUMAN ADAPTATION TO THE COMPUTER

Frederick Andrew Sycuro
Lieutenant Commander, United States Navy Reserve
B.A., University of Louisville, 1975

This thesis is a study of the conceptions and fears that man, as both a user and manager, has regarding the computer. A survey of current literature on the subject of man's adaptation and perceptions to the computer has been reviewed in an attempt to identify specific problem areas.

This study outlines the more common of these problem areas and provides recommendations for both the user and manager to assist in the adaptation, implementation and usage of the computer.

Master of Science in
Information Systems
September 1986

Advisor: N. Lyons
Department of
Administrative Sciences

NPS SUPPLY REQUISITION DATABASE - INTERACTIVE SOFTWARE AS AN ALTERNATIVE TO WRITTEN INSTRUCTIONS

Hartwell T. Trotter
Lieutenant Commander, United States Navy
B.S., High Point College, 1971
M.A., Pepperdine University, 1976
M.S., University of Southern California, 1980

Procedures to execute specific activities are usually communicated in writing throughout large organizations. This thesis presents a prototype example of interactive software as an alternative to the promulgation of written instructions. The Naval Postgraduate School supply requisition generation process has been distilled into a single software package, the Supply Requisition Database (SRdb), which prepares requisition documents and maintains a local database of items ordered. Emphasis is placed upon ease of use and labor efficiency. Although limited initial testing of the software is reported, SRdb is offered primarily as a tool for further research of the concept.

Master of Science in
Information Systems
March 1986

Advisor: N.F. Schneidewind
Department of
Administrative Sciences

OFFICE AUTOMATION COST/BENEFIT EVALUATION: A METHODOLOGY

Christopher W. Urban
Lieutenant, United States Navy
B.A., Villanova University, 1980

Office automation has been credited as a means by which office and organizational productivity can be increased. Incorporation of office automation technology can represent a large investment for any organization. To guarantee the proper allocation of resources, government managers and executives must utilize evaluation techniques which insure that the benefits of a program outweigh the costs. Naval Laboratories have been planning to purchase office automation technology to increase their productivity. To insure that the benefits of office automation can be realized and are cost effective, an evaluation method should be developed which quantifies increases in productivity. The purpose of this thesis is to present an evaluation method which provides ostensive and confirmable evidence with regard to productivity changes and the cost/benefit of office automation. The Naval Laboratories Technical Office Automation and Communications System (NALTOACS) Pilot Assessment and the Automated Technical Information Processing System (ATIPS) at Naval Weapons Center (NWC) China Lake, California were used as the basis of analysis for the development of the evaluation method.

Master of Science in
Information Systems
September 1985

Advisor: K.J. Euske
Department of
Administrative Sciences

CAN EXPERT SYSTEM HELP TRAIN TACTICAL ACTION OFFICERS: SOME EXPERIENCES FROM AN EARLY PROTOTYPE

Sreten Zivovic
Lieutenant Commander, United States Navy Reserve
B.A., University of Illinois, 1973

The variety and complexity of modern weapon systems demands great skill on the part of the Tactical Action Officers (TAOs) in correctly analyzing the threat, and taking appropriate countermeasures, during a naval engagement. Not only do the TAOs need to have the rules of engagement at their fingertips but they also need to apply them in an optimum manner, quite often, within extremely short reaction times. It takes considerable time, effort and experience to perfect the art of TAO decision-making.

This thesis develops a generic model of the TAO decision making process. A prototype TAO expert system is implemented based on the model. The prototype is designed to run on a microcomputer. The system is a pioneering effort in applying artificial intelligence towards supporting TAOs in the accomplishment of their duties. Furthermore, such a system may also be used for training student TAOs.

Master of Science in
Information Systems
March 1986

Advisors: T. Bui
T. Sivasankaran
Department of
Administrative Sciences

MASTER OF SCIENCE

IN

MANAGEMENT

A MULTIVARIATE ANALYSIS OF ENLISTED ATTRITION IN THE ARMY RESERVE

Cynthia A. Albiso
Lieutenant, United States Navy
B.A., University of Kansas, 1973

Kathy M. Buscher
Lieutenant, United States Navy
B.S., Virginia Polytechnic Institute, 1979

The purpose of this thesis is to investigate determinants of early attrition from the U.S. Army Selected Reserve enlisted forces. The sample was selected from fiscal year 1980 through 1982 cohort files maintained by the Defense Manpower Data Center. Selected Reserve enlisted personnel were divided into non-prior and prior service groups. Preliminary analyses were performed which identified significant differences between the two groups relative to the timing and destination of attrition losses. Bivariate analyses of stayer/leaver subgroups revealed significant differences on selected personal and occupational characteristics. Regression analyses were used to examine the influence of candidate explanatory variables on the logistic form of attrition. The variables examined were found to be significant in the analytical results; however, low explanatory power of the models tested indicated a need for reconfiguration of the data base to support future research.

Master of Science in Management
December 1985

Advisors: G.W. Thomas
B.M. Bloxom
Department of Administrative Sciences

THE EFFECT OF RACE ON DETERMINANTS OF JOB SATISFACTION

John R. Albiso
Lieutenant, United States Navy
B.S., U.S. Naval Academy, 1979

The purpose of this thesis is to determine the effect of race on job satisfaction, and the effect of race on those factors considered to be determinants of job satisfaction. The data used for the research was obtained from a survey of military personnel conducted by the Rand Corporation in early 1979. The data was used to test bivariate and multivariate models with job satisfaction as the dependent variable, and factors thought to be determinants of job satisfaction as independent variables. The types of statistical methods employed to detect the effect of race in the various models were, ANOVA, GLM, Factor Analysis, and Regression Analysis. The results of the analysis indicated that race was a significant factor in the determination of job satisfaction, but that the effect of race in models of job satisfaction was very small.

Master of Science in Management
December 19

Advisor: G. Thomas
Department of Administrative Sciences

IMPROVING THE NAVY'S MATERIAL OBLIGATION VALIDATION RESPONSE RATE

Michael A. Anderson
Lieutenant Commander, United States Navy
B.A., Washington State University, 1976

The purpose of this study is to identify reasons for customer activity non-response to Material Obligation Validation (MOV) requests submitted by the Navy Inventory Control Points (ICP). If the non-response rate can be reduced, significant savings in procurement and transportation dollars can be realized. MOV data was extrapolated from ICP files to identify who the major non-responders to MOV requests were for calendar year 1984. Each activity was then contacted to ascertain reasons for non-response. In addition, in-depth interviews and procedural reviews were conducted with individuals responsible for processing MOV requests at the Aviation Supply Office (ASO), Ships Parts Control Center (SPCC) and the Defense Automated Addressing System Office (DAASO). There are numerous reasons identified at the ICP, Defense Automated Addressing System Office (DAASO) and end use activity which prevent an MOV response from getting processed. This study identifies the potential areas for procedural errors and makes recommendations for improvement at each level in the MOV process.

Master of Science in Management
December 1985

Advisor: A.W. McMasters
Department of Administrative Sciences

AN ASSESSMENT OF THE LIFE CYCLE CONTRACTING MODEL FOR USE BY MAJOR AEROSPACE WEAPON SYSTEM ACQUISITION MANAGERS

Kimberly Joy Annunziata
Lieutenant, Supply Corps, United States Navy
B.S., Miami University, 1977

This thesis assesses the utility of using the Life Cycle Contracting Model (developed by Dan C. Boger, Carl R. Jones, and Kevin C. Sontheimer) in major weapon systems acquisition. The conclusions are based on an analysis of LCC model simulated "real world" follow-on production contracting scenarios. "What if" changes are made to the contracting scenario parameters to understand how the LCC model might be used by major weapon system acquisition and contract managers. An analysis shows that the LCC model can be used to interpret the results of trade-off decisions and to assist the contract manager in developing sound negotiating strategy alternatives. Total contract cost to the government cannot be predicted with the model but the effects on total cost of decisions made can be inferred and compared. The LCC model should be used to justify deviations from full and open competition and to demonstrate the predicted results of viable, lower cost alternatives to firm fixed price contracting.

Master of Science in Management
December 1985

Advisor: D.C. Boger
Department of Administrative Sciences

UNITED STATES TECHNOLOGY TRANSFER TO PERU AND VENEZUELA

Alfredo Arrisueno
Colonel, Peru Air Force
B.S., Peruvian Air Force Academy, 1964
Aeronautical Engineer, Argentine Air Force Academy, 1968

Ramon Peraza
Captain, Venezuelan Navy
B.S., Venezuelan Naval Academy, 1964
Naval War College, Venezuela, 1974

Technology has a decisive influence on the daily lives of most of the world populations. Historically, technology has moved from one part of the world to another by a continuous process of transfer.

However, the resultant transference has been quite uneven in its geographical impact, and there is a concern that the "technical gap" between the developed countries and the less-developed countries is widening.

Concern about the widening of the gap and the need to increase the technology transfer process, is the very essence of the economic growth and development needs of less-developed countries.

This thesis examines this gap, and an attempt is made to determine guidelines, initiatives, and mechanisms to facilitate the transfer of U.S. technology to Latin America and specifically to Peru and Venezuela.

Master of Science in Management
December 1985

Advisor: J.W. Creighton
Department of
Administrative Sciences

AN ANALYSIS OF IMPEDIMENTS TO THE PRODUCTIVITY ENHANCING CAPITAL INVESTMENT PROGRAMS AT THE NAVAL AIR STATION, ALAMEDA AND THE NAVAL AIR REWORK FACILITY, ALAMEDA, CALIFORNIA

Carlos S. Boger
Lieutenant Commander, United States Navy
B.A., University of Washington, 1974

This thesis evaluates the impediments to the productivity enhancing capital investment programs to two Naval Activities, Naval Air Station Alameda, and Naval Air Rework Facility, Alameda, California. The analysis uses a management control perspective. Particular issues addressed are what productivity programs are currently being used and why some programs are not yet fully functioning. In examining the productivity programs it was found that certain barriers do exist that impede the full utilization of these programs. The work concludes with the listing of these impediments and recommendations for improving the programs.

Master of Science in Management
December 1985

Advisors: D.C. Boger
K.J. Euske
Department of Administrative Sciences

AN ANALYSIS OF THE ECONOMIC ASSUMPTIONS UNDERLYING FISCAL PLAN FY 1981 - FY 1984

Robert Welch Beck
Lieutenant, United States Navy
B.A., Boston University, 1980

An analysis of the economic assumptions underlying fiscal plans FY 1981 - FY 1984 is described. The forecasts of President Reagan's Economic Recovery Plan are compared to the actual performance of the economy during the respective period. The paper concludes that the supply-side economic policies of President Reagan's plan were not adequately tested by the fiscal experience. However, some objectives of the recovery plan were achieved.

Master of Sciences in Management
June 1986

Advisor: P.M. Carrick
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Administrative Sciences

APPROPRIATIONS DISTRIBUTION TRENDS WITH REGARD TO THE AVAILABILITY OF FUNDS IN THE DON BUDGET

Janet G. Benson
Lieutenant, United States Navy
B.S., University of Minnesota, 1976

This thesis examines the factors affecting the final outcome of the DON budget, both monetary and political. Trends for the four major appropriations areas are analyzed to compare how their distribution changes with regard to availability of funds and Congressional influence.

The data collected for the thirty year period FY55 through FY84 indicated that while DON budgeting is primarily incremental, some appropriations areas fare better than others with changing availability of funds. The Procurement (PROC) appropriation has been the most sensitive to the availability of funds, while Research, Development, Test and Evaluation (RDT&E) also receives its largest shares of the budget during years of abundant funding. Operations and Maintenance (O&M) and Military Personnel (MP) fare better than RDT&E and PROC during lean years, but worse than those categories during abundant years.

Master of Science in Management
December 1985

Advisor: J.L. McCaffery
Department of Administrative Sciences

A MANAGEMENT INFORMATION SYSTEM FOR ALLOCATING, MONITORING AND REVIEWING WORK ASSIGNMENTS

Robert L. Bourassa
Operations Research Analyst, Defense Logistics Agency
B.S., University of Maine, 1971

This thesis investigates the feasibility of developing a small scale management information system on a microcomputer. The working system was developed around the Operations Research Society of America (ORSA) three tiered review and acceptance process for articles submitted for publication in the ORSA journal.

The management information system was designed using Ashton-Tate's dBase III software. As designed, the system will operate on any computer operating under Microsoft's Disk Operating System (MS-DOS). The user must provide his own dBase III software.

A similar management information system could be tailored to almost any operation having a need to monitor, control and evaluate time sensitive workloads.

Master of Science in Management
June 1986

Advisor: F.R. Richards
Department of Operations Research

THE MANPOWER, PERSONNEL, AND TRAINING ANALYSIS SUBSPECIALIST: AN ANALYSIS OF HISTORICAL DATA

Jane Denise Boyer
Lieutenant, United States Navy
B.S., Purdue University, 1977

This thesis presents an overview of the fledgling MPTA subspecialty and its subspecialists. Even though analysis of historical data dominates this research, the recently approved MPTA specialist track is addressed and its impact within the subspecialty community briefly discussed. Topical issues such as availability and utilization of subspecialists, utilization tour completion, and inventory vs. requirements for certain primary officer specialties are addressed. A Markov model is introduced as a method, to predict the distribution of URL MPTA subspecialists in operational/leadership, utilization, and nonutilization type billets. The graduate education steady state quota model is used to show the potential impact of the specialist on total MPTA subspecialist inventories and NPS student inputs.

Master of Science in Management
December 1985

Advisor: P.R. Milch
Department of Operations Research

THE INDIAN OCEAN TRANSPORTATION CHANNELS--A REVIEW OF THE AIR LOGISTICS INFORMATION AVAILABLE TO THE END-USER SUPPLY OFFICER

Richard N. Bradshaw
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B.A., University of Missouri, 1973

The main source of transportation information concerning Indian Ocean logistics channels is contained in widely dispersed manuals and not tied together so that an end-user Supply Officer deploying to the area can understand how material is to reach him in accordance with UMMIPS standards. In addition, an explanation of the use of international air freight forwarding is even more difficult to find. This study reviews various sources of transportation information for the benefit of an end-user Supply Officer onboard a Naval vessel which may be deployed to the Indian Ocean, and who will have need for knowledge of how material will reach him in accordance with established directives and the UMMIPS time standards. This study highlights the air logistics channels in use to the Indian Ocean with emphasis on the use of the international air freight forwarder. The author's conclusion is that Navy publications, directives, instructions, and briefings need to be updated to reflect the methods and procedures for using the air freight forwarders services and the transportation channels in use. This knowledge needs to be disseminated to the end-user Supply Officers to help them decide whether air freight forwarding will meet or exceed the UMMIPS time standards when ordering material.

Master of Science in Management
December 1985

Advisor: J.W. Creighton
Department of Administrative Sciences

THE PROCESS FOR DETERMINING THE MANPOWER AND BUDGET REQUIREMENTS FOR A NAVAL HOSPITAL

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M.A., Webster's College, 1979

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M.A., Webster's College, 1981

In the span of the past twenty years, significant pressure has been exerted on each of the services, by Congress and senior officials in the Department of Defense, to develop methodologies for providing objective, rigorously derived, quantitative justification for resource requirements. Of the programs that resulted, at the Department of Defense level and within the Navy, several were intended to support the manpower and budget requirements determination process for Naval hospitals. Programs eminating from the Department of Defense were the Uniform Chart of Accounts (UCA), Uniform Staffing Methodologies (USM), the Defense Enrollment Eligibility Reporting System (DEERS), and CHAMPUS. Navy sponsored programs were eventually incorporated under the umbrella of the Navy Manpower Engineering Program (NAVMEP). This thesis attempts to describe the process employed within the Navy medical department to determine manpower budget requirements for Naval hospitals, the role of each echelon of the chain of command, and the contributions of the formal programs to the process.

Master of Science in Management
December 1985

Advisors: D. Whipple
S. Liao
Department of Administrative Sciences

JOB SATISFACTION AND RACE AMONG MILITARY OFFICERS

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This thesis investigates the extent of variation in levels of job satisfaction among military officers that could be attributed to race The data comes from the 1978 Department of Defense Survey of Officers and Enlisted Personnel conducted by the Rand Corporation. The population analyzed was black and white officers in all four services, with the ranks of O1 through O3, who were still within their initial period of obligated service. Factor analysis was performed on a set of job characteristics to determine if differences existed between the black and white officers in the ranking and relative importance of these characteristics. The results of the factor analysis used to formulate two multivariate models that explain job satisfaction for black and white officers separately. Knowledge of the aspects of work that are important to these officers can provide manpower planners with information that can improve the attainment of recruiting and retention goals in the future.

Master of Science in Management
December 1985

Advisor: G.W. Thomas
Department of
Administrative Sciences

A CROSS-CULTURAL STUDY OF VALUE SYSTEM IN ORGANIZATION DEVELOPMENT-- A COMPARATIVE ANALYSIS BETWEEN THE KOREAN AND U.S. APPROACHES

Kwan Sik Cho
Major, Republic of Korea Army
B.S., Korea Military Academy, Seoul, 1978

A specific investigation was made into the subject of value studies based on cross-cultural interactions between Korea and the United States, its effect upon the issues of Organization Development (OD), and the possibility of a cultural intervention based on mutual interests and common goals.

This study includes: a general historical and theoretical background on value, some fundamental considerations, an introduction of value systems and their change in América, a comparative value analysis between the Korean and U.S. sample groups through the Personal Value Statement (PVS), a discussion of the value combination and other cross-cultural value issues.

The author concludes that a cross-cultural intervention is possible and needed for the future of Organization Development in Korea.

Master of Science in Management
June 1986

Advisor: R.A. McGonigal
Defense Resources Management Education Center

A REVIEW OF THE DEBATE CONCERNING THE REAGAN ADMINISTRATION'S INCREASE IN DEFENSE SPENDING

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B.S., University of Tennessee, 1975

The overall purpose of this thesis is to examine the debate concerning the consequences of President Reagan's defense buildup program on the U.S. economy and its relationship to the Federal debt. The research methodology employed consists of performing a comprehensive examination of the literature compared with available economic data for the period under study. The effects of the rapid buildup on the issues of inflation, employment, long run growth and the growing Federal debt are examined. The study includes a discussion of the present budget balancing efforts requiring a "fair share" reduction in defense spending to assist in reducing the Federal debt. The study's main conclusions are that the increased defense expenditures did not burden the economy as predicted by many defense analysts. Additionally, budgetary outlay composition data show that the current Federal debt is primarily a result of the growth in uncontrollable spending for social programs and not the recent increases in expenditures for national defense.

Master of Science in Management
December 1985

Advisor: J.L. McCaffery
Department of Administrative Sciences

REORGANIZATION OF THE JOINT CHIEFS OF STAFF: IMPLICATIONS ON JCS BUDGET INFLUENCE

Robert J. Cox
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B.S., University of North Carolina, Chapel Hill, 1975

This paper evaluates a study conducted by the Center for Strategic and International Studies, Georgetown University, on reorganization of the Department of Defense, entitled Toward A More Effective Defense. This study was published in February 1985, and discusses options available for more effective administration and operation of DOD. This thesis evaluates the proposals presented in the CSIS study, concentrating on their impact on the influence of the Joint Chiefs of Staff in the DOD budget process.

Master of Science in Management
December 1985

Advisor: J.L. McCaffery
Department of Administrative Sciences

THE COMPETITION IN CONTRACTING ACT OF 1984

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B.S., United States Naval Academy, 1975

The research focuses on the background, history and implementation of the Competition in Contracting Act of 1984. The research was conducted by a review of the current literature, field research and interviews with key individuals involved in the Federal acquisition process. The purpose of the research is to determine how and why the Competition in Contracting Act came about and the issues involved in its implementation. The major value of this paper is in its contribution to the historical body of knowledge concerning the Competition in Contracting Act.

Master of Science in Management
June 1986

Advisor: D.V. Lamm
Department of
Administrative Sciences

ORGANIZATIONAL ANALYSIS OF THE NAVY PRIMARY STANDARDS LABORATORY--WEST

Michael A.V. Cruz
B.A., San Diego State University, 1975

A formal analysis of the Navy Primary Standards Laboratory-West (NPSL-W) has been performed to assess two objectives: 1) the strengths and weaknesses of current job design and organizational support systems and 2) to determine the readiness for job design change.

Evaluation of the current job and organizational characteristics have been performed using the Job Diagnostic Survey (JDS), the Job Rating Form (JRF), two feedback sessions and questionnaires.

The results of the data show that the organization has strengths in its job characteristics. The jobs are worth doing as perceived by the employees. The weakness in the organization comes from the organizational support systems. These weaknesses are exemplified by dissatisfaction with pay, co-workers and supervision.

Master of Science in Management
September 1986

Advisor: B.J. Roberts
Department of Administrative Sciences

RAPID ACQUISITION OF MANUFACTURED PARTS: METHODS OF CONTRACTING AND INCENTIVES FOR INDUSTRY

Michael M. Darby
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B.A., University of South Florida, 1976

This thesis discusses the Navy's Rapid Acquisition of Manufactured Parts (RAMP) program and several procurement related issues. The objectives of RAMP are to reduce the Navy's spare parts supply, stocking, and procurement problems by fabricating spare parts on demand, in small quantities, and at a reasonable cost. RAMP embodies such new technologies as computer-aided design and manufacturing and flexible manufacturing systems. This study examines RAMP's technology transfer process, incentives available to induce industry investment in RAMP technology, implications of RAMP on competitive procurement, and methodologies to be utilized in making RAMP procurements.

Master of Science in Management
December 1985

Advisor: R.W. Smith
Department of Administrative Sciences

TOWARD DEVELOPMENT OF A NAVAL ORAL HEALTH STATUS INDEX

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Craig Alexander Jimerfield
Lieutenant, Medical Service Corps, United States Navy
B.S., George Washington University, 1978
M.S., Chapman College, 1984

The literature pertaining to general health indexes and a wide variety of oral health indexes is reviewed. The pioneering work of Nikias et al., in demonstrating the feasibility of using expert opinion to develop a comprehensive oral health index, is presented.

After a review of all available literature concerning oral health indexes, it appeared that the oral health status index developed by Marcus et al., using the preference pairs methodology of Mickey and Britt to develop a model based upon the preferences of experts, provided the most promising alternative for an oral health index for use within the Navy's health care system.

Subsequent evaluation of the methodologies employed by Marcus et al., however, revealed a number of problems which questioned the validity of the oral health status index, particularly for use within the Navy. More specifically, these problems related to the patient population sampled and a number of questionable statistical procedures used in the development of the oral health status index.

The major conclusion of this thesis is that no existing oral health index both satisfies the preferences of experts and is suitable for use by health care providers, managers, planners, and other decision makers.

Master of Science in Management
December 1985

Advisors: D.R. Whipple
T.G. Swenson
Department of Administrative Sciences

A SURVEY OF VIDEODISC TECHNOLOGY

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Lieutenant, United States Navy
B.F.A., Auburn University, 1978

In today's computer-based military environment the interactive videodisc offers a means to an efficient education and training system. It allows interactive instruction capable of responding to individual needs. Interactive videodisc also has potential as a mass storage and retrieval system accommodating complete catalogs of printed material. This thesis focuses on a number of studies completed on this new technology.

Master of Science in Management
December 1985

Advisor: W.M. Woods
Department of Operations Research

AN EXAMINATION OF THE INTERRELATIONSHIP BETWEEN THE STRUCTURE OF FINANCIAL MANAGEMENT AND THE INTERNAL AUDIT FUNCTION WITHIN THE DEPARTMENT OF DEFENSE

Frances R. Davis
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B.S., University of Southern California, 1978

This thesis examines the relationship between comptroller functions and internal audit functions within the Department of the Navy and the Department of the Air Force. Comptroller functions and internal audit functions are two significant control systems used in the Department of Defense to manage scarce resources in a complex organization. They are of critical importance to overall effectiveness of financial management.

The organization and nature of the comptroller functions are reviewed first followed by a similar review of the internal audit functions. This study addresses whether or not comptroller functions influence the type of service performed by internal audit.

Master of Science in Management
March 1986

Advisor: J.G. San Miguel
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Administrative Sciences

STUDY OF THE PRODUCTIVITY ENHANCEMENT INITIATIVE, ENGINEERING THE WORKPLACE

Sharen Elizabeth Decherd
Major, United States Marine Corps
B.A., Slippery Rock State College, 1972

John Lawrence Higgins
Lieutenant, United States Navy
B.S.B.A., University of Florida, 1976

The Naval Supply Systems Command (NAVSUP) operates stock points all over the world. Resources expended for the physical distribution function at these stock points amount to millions of dollars per year. It is imperative that these stock points operate to provide higher productivity at lower costs. Engineering the Workplace (ETW) is the productivity enhancement program NAVSUP feels will accomplish this. Comparing ETW with past productivity improvement programs within the Navy as well as current industry proven productivity improvement programs is the method used to determine the requirements and feasibility of its implementation. ETW is built on sound, proven industrial engineering techniques. Commercial productivity improvement programs can be adapted for use at government physical distribution activities. With proper headquarters support and with properly trained, well informed and supportive employees, ETW should be a successful program.

Master of Science in Management
December 1985

Advisor: S.S. Liao
Department of
Administrative Sciences

THE USE OF FORM, FIT, AND FUNCTION IN THE ACQUISITION OF MAJOR WEAPON SYSTEMS

Douglas M. Deets
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B.S., Wright State University, 1976

This research effort was undertaken to analyze the use of Form, Fit, and Function as a second sourcing methodology for major weapon systems. The major objectives of the research were to determine what the main attributes of Form, Fit, and Function were and how it could best be successfully employed.

The researcher found that Form, Fit, and Function would most likely not be used for the reprocurement of entire weapon systems. The real potential of this methodology was in the procurement of components and subsystems. In this regard, it can be used successfully for simple or technically complex items, initial or follow-on buys, and as a means of retrofitting existing equipments. Since there is no need to transfer technical data between sources as in the other second sourcing methodologies, Form, Fit, and Function can also be used when the transfer of technology is impossible, impractical or inappropriate.

Master of Science in Management
December 1985

Advisor: D.V. Lamm
Department of Administrative Sciences

AN ANALYSIS OF THE EFFECTS OF MULTIYEAR PROCUREMENT ON COMPETITION AT THE SUBCONTRACTOR LEVEL

Anthony M. Dovie
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B.S., Rider College, 1974

This thesis was directed at identifying the effects of multiyear procurement (MYP) on the subcontractor competitive environment. Two separate questionnaires were utilized to elicit operational procedures and subjective opinions from a sample of U.S. Navy MYP prime contractors and their vendors associated with the multiyear contract. The responses from the prime contractors were not of sufficient detail to derive any generalized statements about the effects of MYP on their subcontracting activities. The subcontractor surveys indicated a strong consensus of opinion that their current position as a subcontractor created a definite advantage for their firm at contract resolicitation. The perceived negative effects of multiyear procurement are on the subcontractors who have to wait for up to five years to recompete for that segment of business.

Master of Science in Management
December 1985

Advisor: R.W. Smith
Department of Administrative Sciences

ALTERNATIVES IN AUTOMATING SMALL PROCUREMENT FIELD ACTIVITIES; A COST-BENEFIT ANALYSIS

Christopher Barstow Drake
Lieutenant Commander, United States Navy
B.S., Iowa State University, 1976

Steven Grady Carver
Lieutenant, United States Navy
B.B.A., University of Houston, 1976

This thesis examines the costs and benefits associated with automating the procurement function at the small activities of the Navy Field Contracting System (NFCS). Large activities are currently scheduled to receive the Automation of Procurement and Accounting Data Entry (APADE) system. This research evaluates the appropriateness of utilizing APADE in the small NFCS activity as opposed to an alternate existing system that can satisfy the automation needs of the small NFCS activity.

Master of Science in Management
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Advisors: R. Smith
S. Liao
Department of Administrative Sciences

THE APPLICATION OF COST/BENEFIT ANALYSIS IN THE DEVELOPMENT OF VOLUNTARY STANDARDS

Brian E. Fahnestock
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B.A., University of Illinois, 1980

The purpose of this study is to investigate the role and significance of standards to industry and society from an economic perspective. The decisionmaking processes of voluntary standards organizations, such as the American National Standards Institute are examined within a framework of applied economic cost/benefit analysis. The findings of the study emphasize the need for non-engineering evaluation of standards and standardizing activities within single firms, industrywide organizations, or government.

Master of Science in Management
June 1986

Advisor: P.M. Carrick
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Administrative Sciences

COST INFORMATION REQUIREMENTS FOR MANAGING AIRCRAFT REWORK

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B.S., University of South Carolina, 1976

John Wayne Highsmith
Lieutenant Commander, United States Navy
B.S., Florida State University, 1974

Managing the diverse aspects of a Naval Air Rework Facility is a complex and demanding task. This report provides fresh input into two of the areas that are of concern to NARF management on a daily basis.

First is the management of cost data to provide meaningful information for managers at all levels of the organization. Included is a brief explanation of the economic rationalization that supports the Life Cycle Cost concept. A discussion of the types of financial information needed by managers and deficiencies in the NIF accounting system follows.

The next section centers on the basis behind the Reliability Centered Maintenance concept and how the deficiencies in the information collection system at NARF Alameda fail to support the demands of this concept.

Recommendations are provided to alleviate both short and long run deficiencies.

Master of Science in Management
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Advisor: J.W. Creighton
Department of
Administrative Sciences

C.E. Lawler
Naval Air Rework Facility
Alameda, CA

AN ANALYSIS OF THE COST-VOLUME RELATIONSHIPS WITHIN THE AIRCRAFT PROGRAM OF THE NAVAL AIR REWORK FACILITY, ALAMEDA, CALIFORNIA

Robert Lemoine Ferriman
Commander, United States Navy
B.S., University of Kansas, 1969

The purpose of this research project is to examine the cost behavior of the Naval Air Rework Facility, Alameda, California, aircraft program in relation to variations in aircraft rework workloads, and to develop cost-volume relationships useable in support of pricing and workload decisions. Analysis of four years of quarterly direct and indirect cost data provided the base from which total cost-volume models were derived for the four aircraft program segments (A-6, P-3, S-3, and A-3).

The results of this study indicate that significant cost-volume relationships exist not only with the direct costs but also with many associated indirect aircraft program costs. The study further suggests that other factors, such as rate and direction of volume changes and levels of personnel strengths, may have predictable effects on aircraft rework costs.

Master of Science in Management
June 1986

Advisor: S.S. Liao
Department of Administrative Sciences

AN EXAMINATION OF THE FEASIBILITY OF IDENTIFYING MARINE CORPS RESERVE DEPOT MAINTENANCE COSTS FOR USE IN BUDGETING

Robert E. Foulk
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B.S., University of Northern Colorado, 1974

The Marine Corps Reserve has the depot maintenance portion of the O&M, MCR appropriation derived by inflating last year's budget figure. The appropriation is then billed for depot maintenance on a "fair share" basis, with no system to identify whether the costs of work performed by the depot maintenance activities were actually incurred in work performed on Marine Corps Reserve equipment. The focus of this thesis is the breakdown in the current process of linking costs charged to the Reserve appropriation to actual Reserve generated depot maintenance requirements. Two alternative proposals are presented that allow for a link between actual measures of depot maintenance attributable to the Reserves, and the planning, programming, budgeting, and execution processes. The study recommends a change from the current methods of managing depot maintenance for the Reserves to an alternative method which measures Reserve depot maintenance in terms of equipment issued to Reserve units from the supply system.

Master of Science in Management
December 1985

Advisor: J.M. Fremgen
Department of Administrative Sciences

GOVERNMENT MANAGEMENT OF CONTRACTOR SUBMISSION OF VALUE ENGINEERING CHANGE PROPOSALS

Gary George Given
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The purpose of this thesis is to determine how the Department of Defense value engineering policies and processing procedures affect a contractor's motivation to submit value engineering change proposals. A comparative analysis of the DoD Value Engineering Program with private industry's value analysis program and also an examination of how the Hughes Aircraft Company has used the DoD Value Engineering Program, resulted in three conclusions. The first conclusion is that the incentives offered by the DoD Value Engineering Program have been found by private industry to be ineffective in attracting supplier participation in value analysis. The second conclusion is that delays in incorporating the VECP in the end-item significantly reduces a contractor's motivation to submit future VECPs. The third conclusion is that the contractor's perception of the government buying activity's willingness to fairly evaluate VECPs is the most significant influence on a contractor's motivation to submit VECPs.

Master of Science in Management
December 1985

Advisor: P.M. Carrick
Department of
Administrative Sciences

RELATIONSHIP BETWEEN THE ARMED SERVICES VOCATIONAL APTITUDE BATTERY (ASVAB) AND PERFORMANCE IN FLEET READINESS SQUADRON (FRS) ACOUSTIC OPERATOR TRAINING

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The purpose of this thesis is to determine whether the Armed Services Vocational Aptitude Battery (ASVAB) scores, specifically the composite of ASVAB subtests (AR + 2MK + GS) used to predict eligibility for formal training in the Aviation Antisubmarine Warfare Operator (AW) rating, can actually predict the success or failure of enlisted personnel attempting the P-3 fleet readiness squadron (FRS) Acoustic Operator syllabus. This was accomplished by computing a Pearson Product - Moment Correlation Coefficient, corrected for restriction in range, to determine the correlation between ASVAB subtest and composite scores and success or failure in the FRS syllabus. The results indicate that ASVAB scores are only slightly predictive of performance.

Master of Science in Management
March 1986

Advisors: E.V. Haag
H.H. Smith
Department of Administrative Sciences

ANALYSIS OF AN AGGREGATE DEMAND REPAIRABLES MODEL

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B.A., Vanderbilt University, 1973

This thesis develops an aggregate demand inventory model for repairable items. It uses minimization of wholesale stock investment level as the objective function subject to a given mean supply response time (MSRT) goal. Also addressed are annual budget constraints encountered by Inventory Control Points (ICPs) as well as a constraint placed on the total wholesale investment level which is implied by ceilings on the Navy Stock Fund (NSF). Preliminary parametric analyses of the model showed that the wholesale stock investment levels increase at a decreasing rate as repair induction batch sizes are increased and attainable MSRT values decrease exponentially as investment levels increase.

Master of Science in Management
December 1985

Advisor: A.W. McMasters
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Administrative Sciences

A PERFORMANCE COMPARISON OF THE REQUISITION RESPONSE TIME MANAGEMENT INFORMATION SYSTEM WITH THE NON-MECHANIZED FLEET

John Mark Graham
Lieutenant Commander, United States Navy
B.A., University of California at Berkeley, 1972

This thesis focuses on Navy Transportation Time performance from ship date to receipt date. The object is to compare data from a sample of non-mechanized ships with summary statistics from the Requisition Response Time Management Information System. The research effort is directed toward identifying statistical differences between the two sources of data. The analysis concentrates on five major data groups: Transportation Time by consignee, deployment status, modes of shipment, issuing stock point, and Issue Priority Group. The conclusion notes significant differences in Transportation Time performance among the groups.

Master of Science in Management
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Advisor: P.A. Jacobs
Department of
Operations Research

AN ANALYSIS OF THE CONTRIBUTING FACTORS TO THE FISCAL YEAR 1985 MCDOSET ERROR RATES OF THE MARINE CORPS INFANTRY BATTALION

Craig Grotzky
Captain, United States Marine Corps
B.S., University of Utah, 1976

Marine Corps Order 7220.13D prescribes the regulations and procedures concerning the disbursing on-site examinations of Marine Corps organizations. This order created two Marine Corps Disbursing On-site Examination Teams (MCDOSET), one assigned West Coast responsibilities, and the other assigned East Coast responsibilities. The examinations are conducted to determine the correct disbursement of funds to active duty Marines, and error rates are assigned accordingly. This thesis is a descriptive examination of contributing factors to the MCDOSET monetary error rates in Marine Corps Infantry Battalions. From the data accumulated by this study, it was determined that the primary contributing factors to the error rates are the total number of personnel performing their duties in the battalion personnel office, the number of years of supervisory experience of the personnel chief, and the number of years that the personnel chief had held that position in the battalion.

Master of Science in Management
March 1986

Advisor: T.G. Swenson
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Administrative Sciences

TECHNICAL DATA PACKAGE--A SECOND SOURCING METHODOLOGY

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M.A., Webster University, 1983

The purpose of this research is to analyze the Technical Data Package as a second sourcing methodology to create production competition. Two second sourcing models and two major weapon system programs were presented for this analysis. Issues analyzed include technology transfer, Technical Data Package validation, technical data rights, initial investment costs, and maintenance considerations.

As a result of this analysis it is concluded that there is no significant guidance for the application of the Technical Data Package second sourcing methodology. There are circumstances that are particularly inappropriate for the use of this methodology, and the two programs that used this methodology appeared to have met their acquisition goals. This study recommends that one second sourcing model be employed under actual program conditions, and that the program manager perform a comprehensive data package validation prior to using this second sourcing methodology.

Master of Science in Management
December 1985

Advisor: D.V. Lamm
Department of
Administrative Sciences

PLANNING WITHIN THE PLANNING, PROGRAMMING, AND BUDGETING PROCESS

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This paper evaluates the Planning Phase of the Planning, Programming, and Budgeting System (PPBS) used in the Department of Defense (DOD). The evaluation includes the evolution of the PPBS and the participants in the Planning Phase used in the DOD budget process. Conclusions drawn are that the Planning Phase of PPBS is the least studied or understood of all the Department of Defense (DOD) budgeting system phases. Also, public opinion, the intelligence services, and the final budget can cause the National Security Council (NSC) and and Joint Chiefs of Staff (JCS) to modify their planning, but the major influence is the NSC and JCS appraisal of the enemy threat and assets needed to ensure national security.

Master of Science in Management
September 1986

Advisor: J.L. McCaffery
Department of
Administrative Sciences

AN ANALYSIS OF S-3 SDLM CORROSION DOCUMENTATION PROCEDURES

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B.S., Iowa State University, 1976

Mark Evan Karr
Lieutenant, United States Navy
B.S., North Carolina State University, 1978

When senior personnel in Naval aviation are asked the question, "How much time and money are we spending on corrosion prevention and correction?", fairly accurate estimates can be obtained for the organizational and intermediate levels of maintenance because they break out these costs in their maintenance data reporting system. It is virtually impossible to quantify these same costs at the depot level since their current reporting system will not allow for the collection of such information. A second problem, caused by this rather limited reporting system, concerns the inability of the depot level engineering staff to gather sufficient accurate information about the types, extent, and locations of corrosion that occur on aircraft.

This report provides a system design and implementation plan for corrosion monitoring for the Naval Air Rework Facility at Alamoda, California.

Master of Science in Management
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Advisor: J.W. Creighton
Department of Administrative Sciences

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Naval Air Rework Facility
Alameda, California

CONTRACTING STRATEGY FORMULATION FOR PRODUCTION COMPETITION IN MAJOR WEAPON SYSTEMS ACQUISITION

Richard D. Hayes
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Production competition has emerged as a major objective in major weapon systems acquisition. The complexity and length of the acquisition process, and the expense involved in major weapon systems requires that early and careful planning be conducted in order to achieve production competition. In this study, the researcher defines and identifies the characteristics and roles of the acquisition strategy, the acquisition plan, functional implementation plans, and the contracting strategy. The concept of production competition and the feasible methodologies for pursuing it are investigated. Contracting strategy formulation is studied in detail and program issues that are consistently encountered in contracting strategy formulation are presented. A methodology for identifying problem issues in contracting strategy formulation is developed and analyzed. The study concludes that the role of the contracting officer and the contracting strategy is not sufficiently recognized nor defined in the critical role of integrating functional requirements and objectives into an integrated acquisition plan.

Master of Science in Management
December 1985

Advisor: D.V. Lamm
Department of Administrative Sciences

IMPACT OF A HEALTH AND PHYSICAL READINESS PROGRAM ON NAVAL AIR STATION PRODUCTIVITY

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M.Ed., University of West Florida, 1984

This investigation examines the impact of a Health and Physical Readiness Program on Naval Air Station productivity from January 1983 to June 1984 at Pensacola, Florida. Overall scores on the Navy Health and Physical Readiness Test are compared with Aircraft Maintenance Data and Medical Morbidity Reports. Results indicate a dramatic improvement in overall Health and Physical Readiness scores. A significant decrease in the maintenance manhours and repair turn around time is noted for a constant output of items processed. Medical data reveal significant reductions in injuries, motor vehicle accidents, circulatory diseases, alcoholic treatments and weight control cases. Allowing for the dynamic leadership provided by the Commanding Officer and Executive Officer to the Naval Air Station, it still appears that the Health and Physical Readiness Program had a positive impact on Naval Air Station productivity.

Master of Science in Management
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Advisor: D.E. Neil
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Operations Research

AN EVALUATION OF THE ADEQUACY OF THE FINANCIAL MANAGEMENT AND BUDGETING TRAINING PROVIDED TO GROUND SUPPLY OFFICERS IN THE UNITED STATES MARINE CORPS

Robert J. Herkenham
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This thesis evaluates the adequacy of the financial management and budgeting training provided to ground supply officers in the United States Marine Corps. Data, based on the responses to a questionnaire, were compiled to summarize the perspective of operating unit supply officers regarding their financial management/budgeting training. This information is contrasted with data obtained during interviews with selected financial managers in the operating forces regarding their views on the performance levels of supply officers relative to their financial and budgeting duties. The author concludes that the current financial training is not adequate considering the slope of a supply officer's duties at the operating unit level. The author recommends: (1) that the training be expanded to approximately twice its current instruction length and include practical application exercises, and (2) that professional financial managers, not supply personnel, conduct the financial/ budgeting instruction at the ground supply officers course.

Master of Science in Management
December 1985

Advisor: J. McCaffery
Department of
Administrative Sciences

PREPARATION OF THE PROGRAM OBJECTIVES MEMORANDUM: A SELECTIVE EXAMINIATION OF PROCEDURES IN THE DEPARTMENT OF THE NAVY

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B.A., University of Colorado, 1969
M.P.A., The American University, 1981

This thesis examines procedures the U.S. Navy employs in preparing the annual Program Objectives Memorandum. Beginning with an overview of the POM process in the Department of Defense, the thesis proceeds to a detailed exploration of POM activities in the Office of the Chief of Naval Operations. The narrative focuses on two of the major "roles"--Resource and Assessment Sponsors. These two "sponsors" are described as they functioned during the POM-87 cycle, in the context of their relationships with major review groups, claimancies and other major POM participants. Events of the POM-87 cycle are recounted as they actually occurred in two offices, to demonstrate how POM development took place in the real world. Among the major findings is that the Navy POM is prepared according to a variety of procedures, with considerable latitude accorded to individual managers. The complexity of the POM development process has created a web of relationships that is not always clearly understood. A particularly valuable aspect of this work is the bibliography; this listing constitutes an extensive research source for the topic of PPBS in general as well as for Navy POM procedures.

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Advisors: J.L. McCaffery
D.F. Melchar
Department of Administrative Sciences

EXCELLENCE IN NAVY RECRUITING: A LOOK AT HIGH-PERFORMING NAVY RECRUITING DISTRICTS

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Lieutenant Commander, United States Navy
B.S.E., Henderson State University, 1974

Roberta Stein Hersh
Lieutenant, United States Navy
B.S., Pennsylvania State University, 1981

This field study identifies and describes the attributes associated with excellent Navy Recruiting Districts. Phase One of the study discusses the opinions of more than one hundred officers, civilians and enlisted personnel on Navy Recruiting Command and Recruiting Area staffs as to the characteristics and performance of excellent districts. Phase Two of the study identifies seven broad categories that we labeled "Measures of Excellence" (MOEs). These "Measures" describe the attributes of excellence derived from observations and sixty-seven interviews at two districts identified as excellent. Although it may be premature to offer a "model" of an excellent recruiting district, these "Measures" provide a useful means for presenting our findings. The seven Navy Recruiting district "Measures of Excellence" (MOEs) are: Leadership; Systems in Place; Taking Care of People; Communication; Teamwork; Command Climate; and Making Goal with Integrity. Each attribute is discussed and illustrated from the experiences of the officers, civilians, and enlisted personnel assigned to the excellent districts.

Master of Science in Management
December 1985

Advisor: R.T. Harris
Department of Administrative Sciences

THE IMPACT OF LOCAL LABOR MARKET FACTORS ON ARMY RESERVE ACCESSIONS

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This thesis analyzes the impact of local labor market forces on Army Selected Reserve accessions in the period FY 83-85. Accession data from the Defense Manpower Data Center was broken down to zip code level and then aggregated upwards to local market counts. These counts were then merged with similarly aggregated economic data from the Defense Manpower Data Center DORIS database. The resulting file was analyzed using OLS regression techniques to identify characteristics of potentially high yield Reserve recruiting markets.

Master of Science in Management
June 1986

Advisors: G.W. Thomas
S.L. Mehay
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THE REPUBLIC OF KOREA ARMY LOGISTICS MANAGEMENT INFORMATION SYSTEM MANAGER'S INVOLVEMENT

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B.E., Kun Kook University, 1976

One of the major causes for the failure of ROK Army Logistics Management Information System (MIS) is that it does not satisfy the user's information requirements. This, in turn, is most often caused by the fact that those requirements are difficult to obtain accurately and completely.

Simply asking the user what he needs is inadequate without managers' involvement. This thesis reviews the current ROK Army Logistics MIS problems and focuses on the involvement of the manager in information requirements determination and the importance of information requirements determination in the development of MIS.

Three alternatives are presented to increase the manager's involvement involving user self-determination of needs in the ROKA Logistics MIS development. The study concludes that the use of coordination groups represents the most practical and effective solution to the ROKA's Logistics MIS problems.

Master of Science in Management
June 1986

Advisor: M.P. Spencer
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Administrative Sciences

THE UNIFORM COST ACCOUNTING SYSTEM AND STABILIZED RATES AT ANNISTON ARMY DEPOT, ANNISTON, ALABAMA

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The purpose of this research project is to examine the relationship of Department of Defense Instruction 7220.29-H and stabilized rates upon the operations of Anniston Army Depot in Anniston, Alabama.

The analysis in this study is based upon interviews and information received during a personal visit to Anniston Army Depot, telephone interviews with personnel in Chambersburg, Pennsylvania and Washington, D.C., and the analysis of cost data obtained from Anniston Army Depot and the Defense Manpower Data Center for the fiscal years 1981-1984.

The results of this study indicate that the implementation of DoD Instruction 7220.29-H and stabilized rates have achieved their primary objectives although there are limitations that a decision maker should be aware of when interpreting data generated by the system. Not only must decision makers be aware of the underlying assumptions, the data have been found to be of limited value for decision making purposes. Stabilized rates do reflect a price that will be charged customers for work performed, however, the prices charged are not intended to represent actual costs.

Master of Science in Management
December 1985

Advisors: K. Euske
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ECONOMIC ANALYSIS: AN APPROACH TO PROVIDE BASIC GUIDANCE FOR CONDUCTING AND REVIEWING ECONOMIC ANALYSIS WITHIN THE VENEZUELAN NAVY

Marco Jimenez
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B.S., Escuela Naval de Venezuela, 1970

This thesis provides an introduction to the concepts of economic analysis, including a methodology for its practical use. The intention is to promote the uniform application of economic analyses within the Venezuelan Navy. Both benefit-cost and cost-effectiveness analyses are explored, accompanied by an application of economic analysis.

Master of Science in Management
June 1986

Advisor: F.C. Horton
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Administrative Sciences

A STUDY FOR REDUCING THE LENGTH OF THE NAVY'S AIR-LAUNCHED MISSILE MAINTENANCE PIPELINE

Scot William Jones
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B.A., Iowa State University, 1980

This thesis examines the Navy's air-launched missile maintenance pipeline to determine reasons for lengthy missile out of service time and find ways to reduce that time. It identifies areas of potential improvement and makes recommendations to take advantage of these opportunities to reduce the length of the pipeline and increase missile asset readiness.

Master of Science in Management
June 1986

Advisor: J.W. Creighton
Department of
Administrative Sciences

A STUDY OF THE INTERRELATIONSHIP BETWEEN DEFENSE LOGISTICS AGENCY'S WEAPON SYSTEMS SUPPORT CONCEPT AND THE 1985-1990 DEFENSE GUIDANCE

Patricia E. Kemp
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This document addresses Headquarters Defense Logistics Agency's (DLA) concepts established to enhance the readiness and sustainability for the Military Services. Information concerning Defense Logistics Agency's Weapon Systems Support Program (WSSP) from October 1981 to October 1985 is provided. The aggressive weapon system oriented inventory management concept directed by the Secretary of Defense and undergoing implementation by DLA is discussed.

The procedures that DLA will use to accomplish the Secretary of Defense enhanced weapon system support concept are spelled out and an assessment of the benefits to be obtained from the enhanced concept is made.

Master of Science in Management
June 1986

Advisor: J.W. Creighton
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Administrative Sciences

EXCELLENCE IN THE KOREAN AIR FORCE FIGHTER SQUADRONS: VIEW OF THE FIGHTER PILOTS

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B.S., Civil Aviation College, 1976

This is a preliminary study of excellence of the Korean Air Force fighter squadron. The study identifies the attributes associated with outstanding fighter squadrons based upon interviews with fighter pilots who are currently enrolled as students at the Naval Postgraduate School.

After reviewing environmental, structural, and cultural backgrounds of fighter squadron of the Korean Air Force, the qualities of excellence evident from the interviews are described and compared with those of the U.S. Air Force fighter squadrons. The seven attributes which contribute to the excellence of Korean Air Force fighter squadrons consist of unique culture, strong cohesion, member's satisfaction, concern and dedication, flight leadership, and respect for authority.

Master of Science in Management
December 1985

Advisor: R.T. Harris
Department of Administrative Sciences

JOB MOBILITY AND WAGE GROWTH

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The purpose of this thesis is to investigate the effect of alternative job assignments and on wage growth within the firm. A multiple regression analysis is used to examine the influence of job changes and other factors on wage growth. The most highly rewarded type of job mobility is across departmental areas. Also, a performance rating variable significantly effects wage growth. The results indicated that certain mobility paths lead to advancement within the firm. A direction for future empirical analysis for career development is suggested.

Master of Science in
Management
June 1986

Advisor: L.M. Solnick
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Administrative Sciences

THE ROLE OF SPECIFICATIONS AND STANDARDS IN THE DEPARTMENT OF DEFENSE ACQUISITION PROCESS

Mark L. Konetski
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B.B.A., Pennsylvania State University, 1974

The purpose of this research is to investigate the role of the nongovernment standards setting bodies and the Department of Defense in the standards setting process, and; current DoD initiatives to streamline the acquisition process via more efficient selection and application of standards and specifications. Discussions and analyses are conducted in the areas of private standards setting organizations, motives for developing and using standards, various types of standards, and some problems encountered regarding the use or non-use of standards. Attention is focused on Department of Defense (DoD) policies and procedures for the development and adoption of standards and specifications and methods of interacting with nongovernment standards setting organizations. Specific examples are discussed regarding specification and standardization problems in the DoD followed by review of the DoD's Streamlining Initiative. Conclusions reached are: Methods used by the DoD to develop, write, and adopt standards and specifications are undecipherable from current literature; DoD specifications and standards are applied in a haphazard manner, and; The Streamlining Initiative is a successful step in solving some of the DoD's problems with overspecification.

Master of Science in Management
June 1986

Advisor: P.M. Carrick
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Administrative Sciences

AN EXAMINATION AND COMPARISON OF AIRLINE AND NAVY PILOT CAREER EARNINGS

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B.A., The Ohio State University, 1973

This thesis compares lifetime incomes of Navy and major airline pilots. Regression analysis of actual 1983 pilot wages predicts average wages as a function of pilot seniority. Regression results adjusted for post-1983 wage changes are used to forecast thirty-year pilot earnings. The average military benefit of tax-free income and allowances are computed. Three Navy salaries are compared against a weighted-average airline salary. Comparisons are made of earnings and retirement benefits, using a discount rate of five percent.

Two Navy pilot career choices at age thirty are assumed:

1. The pilot remains in the Navy, retires at age forty-two, then joins an airline, retiring at age sixty.
2. The pilot joins an airline and retires at age sixty.

My finding is that a Navy pilot will maximize his income by remaining in the military until retirement, and then flying with an airline. The present value of Navy pay exceeds airline earnings by three to six percent.

Master of Science in Management
March 1986

Advisor: D.A. Henderson
Department of Administrative Sciences

FIGHTER AND ATTACK EXCELLENCE: A LOOK AT TOP PERFORMING F-14 AND A-6 SQUADRONS

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B.S., University of Maine, 1977

Why are some F-14 and A-6 squadrons head and shoulders above others? What makes a squadron excellent? This is the question for this research. The study was conducted in two phases. Phase one involved interviews with 25 senior officers with some past experience in F-14 and A-6 communities. They were queried about their definitions of excellence and were asked to nominate a squadron which met their criteria for excellence. Phase two began with the tabulation of excellent squadrons selected by the senior officers. For the most part the selections in each category and community were unanimous. The selected squadrons were then visited and personnel within the squadron were interviewed and queried about why they felt they were chosen as the excellent squadrons and what they did that was different from other squadrons.

The result of this research has been analyzed and is presented in Chapter two in comprehensive detail. Chapter three contains the summary of what was found.

Master of Science in Management
December 1985

Advisor: R. Harris
Department of Administrative Sciences

THE SPARE PARTS COST CENTER CONCEPT AS A MEANS OF IMPROVING SPARE PARTS PRICING: A CASE STUDY

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B.S., Auburn University, 1976

Spare parts pricing by defense contractors has received considerable attention since 1983 when overpricing cases were widely publicized. Efforts to resolve the overpricing problem focused primarily on requirements determination, technical design, source of supply, and cost allocation methods constrained by existing accounting structures. Other methods of improving spares prices might be identified if the accounting structure could be varied. This research examines the accounting structure and spares pricing method of a single defense contractor to determine if establishment of a separate spare parts cost center within the cost accounting structure would improve the spares pricing process.

The research determined that the spares cost center does not correct the inaccuracies in spares pricing introduced by contractor's accounting structure. An alternative cost center structure, using functional cost centers, does provide a potential means of resolving these problems.

Master of Science in Management
December 1985

Advisor: W.R. Greer
Department of Administrative Sciences

A STUDY OF THE IMPLEMENTATION OF CURRENT COST ACCOUNTING IN THE REPUBLIC OF KOREA ARMY PROCUREMENT SYSTEMS

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B.S., Korea University, Seoul, 1982

This thesis examines the methods proposed and employed to recognize the effects of inflation in financial reporting in Republic of Korea Army (ROKA) procurement. A discussion of the nature of the ROKA procurement system and two alternatives to historical cost financial statements are presented. The concepts, methods and procedures of the historical cost/constant dollars financial statements are described. The proposal for current cost/constant dollars financial statements is presented and emphasis is given to the description of four problems in existing ROKA procurement due to using inadequate accounting information.

Master of Science in Management
June 1986

Advisor: J.M. Fremgen
Department of Administrative Sciences

APPLICATION OF LIFE CYCLE COST CONCEPT IN WEAPON SYSTEMS ACQUISITION FOR THE KOREA MILITARY

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B.S., Korean Air Force Academy, Seoul, 1977

Tai Young Youn
Major, Republic of Korea Army
B.S., Korea Military Academy, Seoul, 1978

This thesis deals with the Life Cycle Cost (LCC) concept and life cycle costing techniques. It also presents the LCC application methodology in new weapon systems acquisition for the Republic of Korea (R.O.K.) military.

Historically, the acquisition of a weapon system in the Republic of Korea has been made on a basis of system effectiveness and initial acquisition cost, with little or no consideration being given to Operating and Support (O&S) costs that will be incurred after the system is deployed in the field. Korea has concentrated on self-production since 1976. Also, Korea still acquires most of its sophisticated systems from foreign countries. Under this situation a broad understanding of LCC concept and techniques are needed.

This thesis introduces the LCC concept, life cycle costing techniques and the methodology for Life Cycle Cost analysis. Then, the aircraft cost-estimating models for application are reviewed. It proceeds with applying the LCC for the aircraft acquisition program. By using the cost-estimating model, two alternative aircraft (F-14, F-18) and an existing aircraft (F-4) are compared, then the preferred alternative for the R.O.K. is selected on the basis of LCC results. It is shown that the F-18 is the preferred alternative aircraft among the two alternatives.

Master of Science in Management
June 1986

Advisor: M.G. Sovereign
Department of
Operations Research

THE AIR COMBAT EFFECTIVE PILOT: AN ANALYSIS OF THE PERSONAL CHARACTERISTICS AND COMBAT SKILLS OF KOREAN FIGHTER PILOTS

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B.S.E.E., Korea Air Force Academy, Seoul, 1978

Recognizing the tenuous position that the Republic of Korea maintains with regard to communist North Korea, the Korean Air Force, as a first line of defense, must maintain the highest level of air combat readiness, the crux of which is the combat effectiveness of its pilots. Through research of past studies, the determinants of the combat effective pilot, combat skills and psychological characteristics, were identified and broken down into component factors, which have positive effect on combat effectiveness and implications for pilot selection, training, and assignment. NPS Korean Air Force students were surveyed as to their perceptions of these factors as they relate to combat effectiveness and their own experience. This activity served as a primitive model for possible expert systems determination of improved objectives in support of Korean Air Force combat effectiveness training.

Master of Science in Management
June 1986

Advisors: T.G. Swenson
M.H. Lepick
Department of Administrative Sciences

THE CONTRIBUTION OF THE PERUVIAN ARMED FORCES TO THE SOCIO-ECONOMIC DEVELOPMENT OF THE COUNTRY

Eduardo A. Leyva
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B.S., Peruvian Air Force Academy, 1961

The armed forces have been considered wasteful and nonproductive institutions by many critics. Defense expenditures are viewed as a negative factor to growth in developing countries. However, given the social, political, and economic conditions in those countries the armed forces often play an important role in modernization and social change.

There appears to be three models explaining this phenomenon: the military's natural role, its direct social and economic activities, and cases of military rule.

In the case of the Peruvian Armed Forces, this evolution has been played through their natural military role. Its social and economic benefits resulted from the primary mission of the military, the direct social and economic activities performed in the accomplishment of their secondary mission, and by their rule of the country.

This role is played without neglecting their defense role and is due to the special conditions existing in the country, such that the role hardly could be performed by other public or private institutions.

This study attempts to organize cultural and military factors into a map of military entrance in social change.

Master of Science in Management
March 1986

Advisor: R.A. McGonigal
Department of Administrative Sciences

CASH MANAGEMENT IMPROVEMENT IN THE NAVY STOCK FUND

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Timothy S. Evans
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

The Navy Stock Fund (NSF) is a working capital fund used to purchase and hold designated inventories of supply items at various stock points until needed by a customer. The fund is currently comprised of ten separate Budget Projects with total collections and expenditures projected to be in excess of $18 billion for Fiscal Year 1986.

The authors examine the background and current operation of the NSF with emphasis on identifying areas which would enable better cash management within the NSF and thereby improve the overall cash position of the U.S. Treasury.

Six areas not presently included in specific Federal cash management programs are identified which offer potential NSF cash management improvements. Ten specific cash management recommendations are provided which would assist in minimizing the amount of NSF cash held outside the Treasury Cash Account.

Master of Science in Management
March 1986 (Linguist)
June 1986 (Evans)

Advisor: J. San Miguel
Department of Administrative Sciences

THE FEASIBILITY OF INSTITUTING A DEPARTMENT HEAD SCREEN IN THE NAVAL SPECIAL WARFARE COMMUNITY

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Lieutenant, United States Navy
B.S.M.E., University of New Mexico, 1878

This effort explores the feasibility of establishing a Department Head Screen in the Naval Special Warfare (NSW) Officer Community currently proposed by NMPC-413D, the NSW Detailer/Placement Officer. It looks at the current state of the NSW community, and through use of the Structured Accession Planning System for Officers (STRAP-O) model, projects the community from 1985 to 1991 both with and without a Department Head Screen, and compares the two. It reviews the response to the proposal from both Naval Special Warfare Groups and evaluates the pros and cons of the idea. Conclusions are then drawn and recommendations made.

Master of Science in Management
December 1985

Advisor: D.E. Neil
Department of Operations Research

THE DON EVALUATION AND CONTROL PROCESS FOR FINANCIAL MANAGEMENT SYSTEMS

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The Office of Management and Budget has prescribed overall policy for government agencies to follow in developing, operating, evaluating, and reporting their financial management systems. As a result of this guidance and subsequent Department of Defense directive, the Department of the Navy has developed an integrated and coordinated approach for the review, evaluation, and control of financial management systems called the DON Evaluation and Control process for Financial Management Systems. Divided into the five components of Information System Architecture, Systems Inventory, Compliance Review, Internal Control, and Master Plan, it is aimed at satisfying higher authority requirements as well as internal organizational and informational needs. The process is designed and implemented to meet financial management standards and to achieve improved financial management. The purpose of this study is to review the policies and procedures of the process that DON executive departments must follow in the development, operation, evaluation, and reporting of DON financial management systems, and to provide DON financial managers an appreciation and awareness for the importance of this process.

Master of Science in Management
June 1986

Advisor: J.R. Duke
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REVISION OF THE DOLLAR THRESHOLD FOR PROCUREMENT ITEMS

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B.S., Illinois Institute of Technology, 1980

This thesis defines and analyzes the Department of Defense proposal to revise the method of determining whether items of equipment are financed from Procurement accounts or Operation and Maintenance accounts.

Problems with the method currently in use are explained, along with Congressional objection to the Department of Defense proposal of revision.

Data on the cost of items of equipment are presented and analyzed to determine the adequacy of the current dollar threshold that determines whether items are funded from Procurement accounts or Operation and Maintenance accounts. A method for determining a dollar threshold that will better meet the needs of the Department of Defense and still be acceptable to Congress is explained.

Master of Science in Management
June 1986

Advisor: J. Frangen
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Administrative Sciences

AN EVALUATION OF THE PRODUCTIVITY ENHANCING CAPITAL INVESTMENT PROCESS AT THE SHORE INTERMEDIATE MAINTENANCE ACTIVITY LITTLE CREEK, VIRGINIA

William Jordan Marshall, III
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B.A., Villanova University, 1972

This thesis evaluates the productivity enhancing capital investment (PECI) process at the Shore Intermediate Maintenance Facility (SIMA) Little Creek, Virginia. Based upon an on-site study, the existing PECI projects, the PECI application process, and productivity enhancing ideas are described. The structure of SIMA's organization has resulted in a filtering mechanism that restricts the flow of productivity enhancing ideas. Recommendations to improve the productivity enhancing process at SIMA Little Creek are enumerated.

Master of Science in Management
December 1985

Advisors: D.C. Boger
D.E. Melchar
Department of Administrative Sciences

AN EMPIRICAL ASSESSMENT OF DEFENSE CONTRACTOR RISK 1976-1984

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B.S., Auburn University, 1974

This thesis attempts to analyze and measure the relationship between defense contractor risk and rate of return. An historical perspective is gained through an extensive review of significant legislation, studies, and policy changes related to this topic. The government contracting environment and the associated risks are examined from the perspectives of both the government and contractors. The nature of risk and methods of risk analysis are investigated. Empirical analysis of the defense contractor risk-return relationship is performed utilizing four methods: mean-variance analysis of rate of return, the Capital Asset Pricing Model, mean-variance analysis of total and government backlog, and mean-variance analysis of Five-Year Defense Program elements. Emphasis is placed on investigating the feasibility of adapting Gloria Hurdle's Leverage, Risk, Market Structure and Profitability Model to evaluate the Department of Defense contract pricing, financing, and profit policies.

Master of Science in Management
June 1986

Advisor: D.C. Boger
Department of Administrative Sciences

THE CONVENTIONAL AMMUNITION REQUIREMENTS DETERMINATION PROCESS OF THE U.S. NAVY

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B.S., United States Naval Academy, 1974

The objective of this thesis is to analyze the Requirements Determination procedures in the Navy's Conventional Gun Ammunition System in an attempt to identify areas for potential improvement. The Conventional Gun Ammunition System involves a logical progression of steps initiated on an annual basis. The Secretary of Defense begins the process by issuing broad guidance for the development of documentation to support budget submissions for combat and non-combat ordnance. The methods and procedures which are then used for determining procurement and renovation requirements involve extensive interactions between the Naval Sea Systems Command, the Ships Parts Control Center, and the Naval Ammunition Production Engineering Center. These interactions are being facilitated by a move toward a real time information system. Finally, areas for Navy concentration such as linking the procurement and renovation budget programs and minimizing delays in inspection and disposal are recommended to help make the future Requirements Determination system more efficient than the present one.

Master of Science in Management
December 1985

Advisor: A.W. McMasters
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Administrative Sciences

A REGRESSION MODEL OF THE EFFECTS OF PERSONNEL CHARACTERISTICS ON AVIATION READINESS AND PRODUCTIVITY

Thomas Robert Maxfield
Major, United States Marine Corps
B.S., California State College, Long Beach, 1979

A multiple regression model demonstrating the impact of personnel characteristics on unit effectiveness is developed. Personnel and aircraft data is compiled on nine U.S. Marine Corps F-4 fighter aircraft squadrons for the analysis. Conclusions identify several personnel characteristics that have an impact on a squadron's mission capable rate. It is recommended that further analysis be done acquiring and analyzing several other personnel characteristics and their impact on this model.

Master of Science in Management
December 1985

Advisor: L.M. Solnick
D.R. Whipple
Department of Administrative Sciences

A COST DETERMINATION MODEL FOR THE FUNCTIONAL CONTEXT TRAINING REVISION OF BASIC ELECTRICITY AND ELECTRONICS TRAINING

Gregory J. McCannel
Lieutenant Commander, United States Navy
B.S.(Ed.), University of Idaho, 1975

This study is an examination of the use of a cost determination model in assessing the costs associated with Navy training courses. Derived from a foundation of the fundamental principles and cost concepts found in the structure of the Navy's training system, instructional methodologies, and economic analysis, a cost determination model known as COSTDEMO is constructed. The model is designed to provide an analyst or manager with a single, dollar cost of a course of instruction. Using the Navy's Functional Context Training (FCT) project program revision of Basic Electricity and Electronics (BE/E) training as a case study, COSTDEMO is used to compute the training costs associated with the three methods of instruction being evaluated by the project. A cost analysis is made between the alternatives from the cost data provided by the model.

Master of Science in Management
December 1985

Advisors: L.A. Armijo
T.G. Swerson
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AN EXAMINATION OF TECHNOLOGY TRANSFER AS A TOOL FOR MANAGEMENT

Don Berton McCorkendale
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B. S. Southwest Missouri State University, 1974

This thesis is an examination of the technology transfer process as it relates to contemporary management practice. The objective is to acquaint the reader with the concept of technology transfer and the mechanism of information flow within business organizations. Includes an in-depth analysis of the predictive model of technology transfer with an emphasis on the interrelationship between management and the factors affecting information flow.

Master of Science in Management
March 1986

Advisor: J.W. Creighton
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AN APPLICATION OF COST RISK IN INCENTIVE CONTRACTS

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This paper begins with an examination of the literature concerning incentive contract effectiveness and contractor motivation. Citing the most frequently supported conclusions, the researcher integrates these with a cost risk analysis methodology based upon the Beta distribution. The result is a share curve that automatically adjusts the share ratio based upon estimated cost variance.

The researcher suggests that this approach is better at reflecting cost risk than the standard linear design. The share curve provides more risk sharing, especially at higher levels of cost variance, and provides both significant rewards and penalties only for significant deviations from target cost. The final conclusion is that the share curve mitigates the defense contractors' "risk averse" nature, thus allowing the profit motive to become operative in incentivizing the contractor to control or reduce costs.

Master of Science in Management
December 1985

Advisor: W.R. Greer
Department of Administrative Sciences

A CASE STUDY OF THE LOGISTICS SUPPORT OF THE AN/SLQ-32 ELECTRONIC WARFARE SYSTEM

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B.S., United States Naval Academy, 1977

The trade-offs made by a Program Manager in a weapon system program are frequently at the expense of logistics support. This thesis is a case study of the logistics support of an electronic warfare system program, designated AN/SLQ-32. The AN/SLQ-32 Program provides an example of the classic problems that result when logistic planning is neglected and underfunded in a weapon system program. The initiatives taken by the Navy to correct the logistic problems of the AN/SLQ-32 are presented with respect to their impact on two measures of effectiveness; Operational Availability and Systems Material Availability. The research concludes, that to ensure a weapon system will meet its Operational Availability goals there must be a sound logistic support plan established early in the program, and it must be strictly adhered to and monitored.

Master of Science in Management
December 1985

Advisor: R.D. Evered
Department of Administrative Sciences

GENERIC OBSTACLES AND DIFFICULTIES ASSOCIATED WITH THE MEASUREMENT AND ENHANCEMENT OF PRODUCTIVITY IN SHORE INTERMEDIATE MAINTENANCE ACTIVITY (SIMA), NORFOLK, VIRGINIA

Christopher M. Moe
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

This study examines the current effectiveness of measures utilized by Shore Intermediate Maintenance Activity (SIMA), Norfolk to enhance productivity through capital investment. Included is a brief history of the Productivity Enhancing Capital Investment (PECI) Program and the effects of past legislation by the Department of Defense (DoD), leading to the current program within the Department of the Navy (DoN). The analysis includes opinions and impressions of various levels of management within the organizational structure of SIMA. This study culminates in a discussion of the current impediments affecting the effectiveness of the PECI program.

Master of Science in Management
December 1985

Advisors: D.C. Boger
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GOVERNMENT FURNISHED PROPERTY: MANAGEMENT AND ACCOUNTING

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This thesis assesses property management in Department of Defense (DoD) contract administration activities. A brief history of property administration and events which have led to criticism of DoD management and accounting is presented. Acquisition strategy is reviewed to provide perspective and rationale for the use of Government furnished property (GFP). Data was collected from seven contract administration activities through visits and interviews with Property Management Specialists.

The conclusions provide assessments of the system, regulations, organization, and staffing for the management and accounting of GFP. Evidence reveals: low risk for contractor, low organizational visibility for property management and critical shortage of staffing. Recommendations include: a balanced sharing of risk between Government and contractor and a more career enhancing organizational structuring of the property management function within contract administration activities.

Master of Science in Management
June 1986

Advisor: W.R. Greer
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Administrative Sciences

TO BE THE BEST, A STUDY OF EXCELLENCE IN UNITED STATES MARINE CORPS INFANTRY BATTALIONS

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Captain, United States Marine Corps
B.S., United States Naval Academy, 1977

"To be the Best, A Study of Excellence in United States Marine Corps Infantry Battalions," is a study conducted to test the hypothesis that common attributes are shared by excellent battalions. Interviews were conducted with thirty-one senior infantry officers from various stateside commands, from which it was concluded that excellent battalions do possess a common set of attributes that account for their superior performance. To further develop this narrative model of excellence, and present a clearer picture of how an excellent battalion operates, interviews were subsequently conducted with staff noncommissioned officers, noncommissioned officers, and junior enlisted men from various infantry units. Attributes dealing with balanced excellence, leadership, emphasis on goals, culture and values, and the environment of excellence are discussed in detail.

Master of Science in Management
December 1985

Advisor: R.T. Harris
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DOD CONTRACTOR PROFITABILITY, 1980-1984

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B.A., University of Florida, 1973

The overall purpose of this study is to present appropriate comparative data on major DoD contractors and to evaluate their profitability during the period 1980-1984. The study is structured to examine two principal research questions as they apply to a sample of 49 prime DoD contractors. The first examines profitability from the macro level, i.e., the defense industry taken as a whole. The second involves an analysis of several defense contractors at the micro level, i.e. individual firms and specific business segments. The study includes a discussion of the defense perspective of the 1980's, an historical summary of DoD defense policy, a review of profit studies, and a summary of selected financial data. The study's main conclusions are that on the basis of the profitability measures selected and for the period 1980-1984, DoD prime contractors were (1) more profitable than their like-sized commercial-oriented competitors, and (2) on both an aggregate and segment basis, less exposed to risk.

Master of Science in Management
December 1985

Advisor: L. Darbyshire
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MANAGEMENT CONTROL IN THE ACQUISITION OF AUTOMATIC DATA PROCESSING AND INFORMATION SYSTEMS COMPONENTS

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B.S., University of West Florida, 1970

The objective of this thesis is to review the system of management control within the Department of the Navy (DoN) for the acquisition of automatic data processing and/or information system (ADP/IS) equipment components. Specific areas described in the research include the DoN Life Cycle Management (LCM) system for ADP/IS and the operation of the DoN computer acquisition program (CAP) within the Department of Defense (DoD) Planning, Programming and Budgeting System (PPBS).

The conclusions contained in this thesis identify strengths and weaknesses of the ADP/IS LCM and CAP systems. Strengths include (1) a well-documented programming and budget formulation system for investment type ADP/IS equipment components and (2) a well-documented LCM process for ADP/IS. Weaknesses include (1) the lack of a formalized decision mechanism to allot apportioned CAP funds given the occurrence of contingencies during budget execution and (2) a potential for not effectively executing the defined interfaces between the LCM and CAP systems. Specific recommendations are provided to (1) improve the management control of CAP funds during budget execution given the occurrence of expected contingencies and to (2) reduce the potential for ineffective interface between the two systems.

Master of Science in Management
December 1985

Advisors: K.J. Euske
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THE MARINE CORPS FLYING HOUR PROGRAM

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B.A., University of California, 1979

The objective of this thesis is to examine the structure and process of budget formulation and execution of the USMC tactical air flying hour program. It looks at how flying hour requirements are translated into budget requests, how the allocated funds are managed, and examines methods of evaluating the effectiveness of the program. Data and information was collected by field visits and interviews with program managers, funds administrators, SecNav analysts, representatives of the Fiscal Division and Aviation branches at Headquarters Marine Corps, and fleet operations and fiscal managers.

The basic conclusion from this study is the current program is underfunded because it is incorrectly stated. The efficiency of the program can be improved to increase the effectiveness of the program. Of the alternatives presented some are relatively minor and could provide some improvement to the current system, while others are far more radical and would result in major modifications.

Master of Science in
Management
June 1986

Advisors: J.L. McCaffery
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THE GUARANTEED TRAFFIC PROGRAM IN THE DEFENSE LOGISTICS AGENCY

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Defense Logistics Agency
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This thesis examines the Guaranteed Traffic Program (GTP) as it is currently being used in the Defense Logistics Agency (DLA). A detailed description of the program is given from its inception through implementation, using as an example, the Defense Depot, Tracy, CA. Transportation costs and transit times, covering a three-year period, are analyzed to determine the effect that guaranteed traffic has had on these factors. Finally, a method of projecting future transportation costs is reviewed for use in transportation cost analysis.

Master of Science in Management
March 1986

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ALTERNATIVE SURFACE WARFARE OFFICER CAREER PATHS AND THEIR POTENTIAL FOR REDUCING PERMANENT CHANGE OF STATION COSTS

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This thesis presents and analyzes several alternative surface warfare officer (SWO) career paths. The paths are designed to reduce permanent change of station (PCS) costs by reducing the number of PCS moves in an officer's career while meeting sea billet requirements, minimizing turbulence within the SWO community and maintaining a viable career path for the officer. The reduction in the number of moves is primarily accomplished through the extension of tour lengths or greater use of homesteading. The analysis is accomplished on a personal computer with software constructed in an earlier Naval Postgraduate School thesis. The analysis is directed at determining feasibility of the career paths presented and where applicable identifies the number of PCS moves eliminated.

Master of Science in Management
December 1985

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PROFITABILITY OF USING FORECASTING TECHNIQUES IN THE COMMODITIES MARKET

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Box and Jenkins' Autoregressive Integrated Moving Average (ARIMA) forecasts for commodity prices one year into the future are compared to the futures market for accuracy. The ARIMA forecasts were nearly as accurate as the futures prices for predicting commodity prices. On the average, the futures market's Mean Absolute Percentage Error (MAPE) was approximately one percent less than that of the ARIMA models. By incorporating the ARIMA forecasts with the futures prices, it was concluded that a more profitable strategy for purchasing commodities could be obtained. This study showed that an average percentage reduction in purchasing costs of approximately twenty percent resulted when using the policy of buying commodities through futures only when the futures price was less than the ARIMA forecast price.

Master of Science in Management
December 1985

Advisor: S.S. Liao
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EVALUATION OF NAVAL RESERVE PERSONNEL RECORDS: AN ANALYSIS OF PROBLEM AREAS

Dana J. Nielsen
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B.A., University of Wisconsin, Whitewater, 1972

The objective of this study is to determine (1) the accuracy of service records of Naval Reserve personnel, (2) if location of activity maintaining records affected the records, (3) how informed personnel were about their records, (4) perceptions of personnel about the role of their records, and their responsibility in maintaining them. The data source was a sample of 167 records and personnel at two Naval Reserve Centers and three record keeping centers. Service Records from each center were reviewed, and the results were attached to a questionnaire which was administered to appropriate members. A modified questionnaire was administered to personnel whose records had not been examined. Analysis of data led to the conclusions that (1) there were systematic errors in officers' records, but not in enlisted records, (2) the location of the record keeping did not affect enlisted records, but did seem to affect officer's records, (3) a majority of the personnel were well informed about their records, (4) perceptions held by personnel about their service records are consistent with Navy policy.

Master of Science in Management
June 1986

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EVALUATION OF UNIFORM COST ACCOUNTING SYSTEM TO FULLY CAPTURE DEPOT LEVEL REPAIR COSTS

David Richmond O'Brien
Lieutenant Commander, United States Navy
B.A., University of Missouri, St. Louis, 1974

The purpose of this research project is to evaluate the capability of the Uniform Cost Accounting System as defined in Department of Defense Instruction 7220.29-H to fully capture depot level repair costs. Its methods of accumulating, standardizing, and reporting cost elements at the San Antonio Air Logistics Center are examined. Analysis of similarities in methods used in calculating stabilized rates used for customer billing, the actual cost accounting system, and the 7220.29-H reporting requirements and how these systems comprise the overall control system at SA-ALC is emphasized. The analysis in this study is based on information obtained from internal documents and an on-site visit to the San Antonio Air Logistics Center. The results of this study indicate that while there are discrepancies in the stabilized rate, cost accumulation, and 7220.29-H reporting systems, the discrepancies are not significant.

Master of Science in Management
December 1985

Advisors: S.L. Ansari
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BUDGET EXECUTION EXERCISE FOR USE IN THE FINANCIAL MANAGEMENT IN THE ARMED FORCES COURSE AT THE NAVAL POSTGRADUATE SCHOOL

James F. Oikle
Lieutenant Commander, Supply Corps, United States Navy
B.B.A., University of Massachusetts, 1968

This thesis develops a budget execution exercise for use in the MN-4154, Financial Management in the Armed Forces course at the Naval Postgraduate School. The comptroller at field level commands is identified as the individual responsible for budget execution. Three commands, The Naval Postgraduate School, Monterey, California; The Naval Air Station, Brunswick, Maine; and the Supervisor of Shipbuilding, Bath, Maine, were studied to determine the techniques field comptrollers use to deal with problems related to budget execution. Using the information obtained from the research, a practical exercise was developed. The exercise covers one fiscal year and includes problems encountered in starting the fiscal year, emergent situations requiring funding augmentation from the sponsor, and year-end close out problems.

Master of Science in Management
December 1985

Advisors: D.E. Melchar
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DOCUMENTATION AND ANALYSIS OF RATE DEVELOPMENT AND COST ACCUMULATION AT NAVAL AIR REWORK FACILITY, NORFOLK

John W. Orrison
Lieutenant Commander, United States Navy
B.S., Purdue University, 1973

The purpose of this thesis is to define and compare the methods used for rate development for budgeting and stabilized rate billing purposes and the actual cost accumulation/Uniform Cost Accounting System (DODINST 7220.29-H, Ref. 1) as used in the Naval Aviation depot level maintenance system to accepted cost accounting practices as identified in the accounting literature and the Cost Accounting Standards and Regulations.

The research was conducted as a field study which consisted of two trips to the Naval Air Rework Facility located at the Naval Air Station, Norfolk, Virginia. Five days of interviews were conducted with Comptroller Department personnel.

The results of this study indicate that problems associated with inconsistencies noted in rate development, budgeting and reporting are not the result of actions at the depot level. Further study at higher echelon levels is warranted.

Master of Science in Management
December 1985

Advisors: S. Ansari
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ANALYSIS OF THE NAVY'S TIMEKEEPING SYSTEM VERSUS AUTOMATED ALTERNATIVES

Cindra E. Otto
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B.S., Indiana University, 1978

The Department of the Navy is presently operating under a predominately manual system for the collection of attendance and labor distribution data. Recent technological progress in automated data collection systems has provided a multitude of alternative means of collecting this source data.

Under guidance of the Department of Defense Instruction 7041.3, on economic analysis and program evaluation, this study presents an economic analysis of the cash flows associated with the present manual system. It further analyzes a sample of automated alternatives to this system and their associated cash flows for the purpose of comparison. The respective system benefits and capabilities are also compared. The study concludes with the selection of the source data collection system that is the most cost effective.

Master of Science in Management
December 1985

Advisor: S.S. Liao
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A COMPARISON OF EFFICIENCY AND COST-EFFECTIVENESS OF RADIAC REPAIR FACILITIES

Annie L. Pair
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B.A., Virginia Polytechnic Institute, 1973

This study describes the Radiac Program and presents a methodology for examining the productivity and cost effectiveness of two repair facilities, one civilian-manned and the other military-manned. A three-fiscal-year set of summary work data (FY 1980, FY 1981, and FY 1982) was used in the analysis.

The data analysis shows the civilian-manned repair facility to be almost twice as productive in output per manhour. The study theorizes that the civilians' level of skill and familiarity with radiacs accounts for their high productivity as compared to the military.

The analysis also finds that civilians are almost three times as efficient in output per constant labor dollar as the military. This is the result of the 50% lower cost per man-hour worked, in combination with their newly doubled productivity.

Master of Science in Management
December 1985

Advisor: R. Nickerson
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AN ANALYSIS OF THE REPUBLIC OF KOREA ARMY OFFICER PERFORMANCE EVALUATION SYSTEM

Nam Gyu Park
Major, Republic of Korea Army
B.S., Korea Military Academy, Seoul, 1977

The purpose of this thesis is to examine the Republic of Korea Army Officer Performance Evaluation System which is used to evaluate its officer personnel. This is accomplished by approaching the issues from two directions: the U.S. military evaluation system and an analysis of questionnaires and interview data based on a model of the accuracy of a performance evaluation process.

It is concluded that the Republic of Korea Army Officer Performance Evaluation System must focus on rater motivation, feedback of rating results for developmental role of future performance as well as an evaluative role of past performance, attention must also be given to deficiencies resulting from using a relative rating system.

Finally, based on the foregoing analysis, an alternative for rater motivation and modification of the evaluation format are suggested to increase the efficiency and effectiveness of the current R.O.K. Army Officer Performance Evaluation System.

Master of Science in Management
June 1985

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CONTROLLING LIFE-CYCLE COST: A MANAGEMENT PERSPECTIVE

David L. Porter
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The objective of this research is to examine the obstacles which are preventing the Navy from realizing the full economic advantage of a total cost management program for aviation support equipment. The research has shown that Navy program managers are not fully committed to managing life-cycle cost nor is it considered early enough in the procurement process to influence design. To improve the life-cycle cost management effort, existing policies and provisions included in DoD Directives should be applied to aviation support equipment. More emphasis should be placed on the RFP as a means of communicating the Navy's concerns about controlling cost and adequate information should be provided to the contractor to be used in developing realistic cost estimates. Finally, life-cycle cost should be elevated to the level of unit-production cost, schedule and performance and made a mandatory source selection criterion.

Master of Science in Management
December 1985

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THE ECONOMICS OF THE COMMODITY MARKET OPERATIONS

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B.S., La Roche College, 1980

Many organizations in the private and public sector rely on commodities for inputs to their production processes. To provide the needed organizational structure for the purchasing and selling of these commodities formal commodity markets were established. This study investigates the different functions of the futures market organization as well as their behavior and performance. The focus is on the development of futures markets for a small range of commercial transactions. The market, because of its volatility is, overall, extremely risky. The future market organization not only permits a transfer of risk but also results in less total risk to society. Resulting from the reduced risk in the aggregate, larger amounts of production and inventory carryover are undertaken. A thorough understanding of the market organization and the causes for price movements are advised prior to entering into a transaction.

Master of Science in Management
June 1986

Advisor: P.M. Carrick
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A COST COMPARISON OF AVIATION PERSONNEL: ACTIVE VS. RESERVE

Michael Paul Rishel
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B.S., United States Naval Academy, 1969

This thesis addresses aviation personnel cost differences between Active and Reserve Aviation Units. Current costing methods and figures developed by the Center for Naval Analysis provide the basis for developing the cost comparisons. The study provides a contrast to past personnel cost comparisons by analyzing the cost differentials between Active and Reserve Units whose annual operating tempos are approximately equal. During the cost comparison, significant cost differentials are identified and factors affecting the realization of any cost savings are discussed. Costing methods that conflict with information developed during the research phase are analyzed and discussed. The cost comparison does not attempt to validate the Center for Naval Analysis' costing approach, but it does provide actual data that will contribute to future validation efforts.

Master of Science in Management
December 1985

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REDUCING REPAIR TURN AROUND TIME OF DEPOT LEVEL REPAIRABLES AT NAVAL SHIPYARDS

Joseph Robert Rodwell, Jr.
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B.S., University of South Carolina, 1972

This thesis examines the key issues that have caused Repair Turn Around Time (RTAT) of Depot Level Repairables (DLRs) managed by the Ships Parts Control Center (SPCC) and overhauled by naval shipyards to be excessive. Many of the DLRs repaired by naval shipyards exceed the Naval Supply System Command's goal of 60 days. Four Navy shipyards were visited to gather RTAT data on DLRs and identify potential improvements in the Designated Overhaul Point (DOP) repair process that will reduce RTAT. An analysis of the policies and procedures used by SPCC in preparing workload forecast as well as the effects of the forecast on the shipyard repair process was also conducted. Recommendations are made to improve the management of repairables in shipyards through Command support and the use of an Automated Repairables Management Information System (ARMIS). Recommendations are also offered to improve piece part support used in the repair of DLRs.

Master of Science in Management
December 1985

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THE COMMERCIAL ACTIVITIES PROGRAM: LESSONS LEARNED FROM LITIGATIONS

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Deep rooted conflicts among key players in the Commercial Activities (CA) program pose a major threat to its viability. The controversies often result in litigations. This study examines legal decisions rendered by selected judicial entities on matters relating to OMB Circular A-76 implementation. It identifies lessons learned and recommendations for improvements to the CA process. The study concludes that the government has experienced great success in litigating A-76 disputes, primarily because the courts have taken the position that the propriety to contract out is an executive discretion not reviewable by them. The study recommends that government personnel should become infinitely familiar with General Accounting Office determinations since their decisions impact most heavily on the daily implementation of Circular A-76.

Master of Science in Management
December 1985

Advisor: P.M. Carrick
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ANALYZING THE COST EFFECTIVENESS OF USING FLIGHT SIMULATORS IN THE ISRAELI AIR FORCE

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During the last decade flight simulators have been increasingly used in the training of the Israeli pilots. The increasing cost of a training flying hour, the shrinking training airspace over Israel since 1979, and the high performance standards required of the Israeli Air Force air crews were the accelerator factors in this process.

This thesis describes a way to analyze the cost effectiveness of the present mix of flight simulators and flying hours in the training process of the I.A.F. air crews. The jet fighters, helicopters, and transportation communities are used as examples to demonstrate the implementation of the analysis. These examples give the reader a general picture of the cost effectiveness of using flight simulators in the I.A.F.

Master of Science in Management
December 1985

Advisor: R. Evered
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BASIC TECHNIQUES OF INVENTORY MANAGEMENT WITH POSSIBLE APPLICATIONS TO IMPROVE THE EXISTING INVENTORY CONTROL OF THE HELLENIC NAVY

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B.A., Graduate School of Industrial Studies, 1966
B.S., Hellenic Naval Academy, 1970

The Hellenic Navy faces many difficulties concerning the finding and supplying of materials due to a variety of causes. The main emphasis of this thesis is to introduce into the Hellenic Navy some basic inventory techniques used by the United States Navy. These techniques could be applied and implemented in the Hellenic Navy after a degree of modification. Application of these techniques would improve and update the inventory control of the secondary (or auxiliary) items. Emphasis has also been placed on minimizing the average annual inventory costs.

Master of Science in Management
December 1985

Advisor: J.W. Creighton
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AN HISTORICAL ANALYSIS OF DEPARTMENT OF DEFENSE BUDGET TRENDS, REQUESTS, AND JUSTIFICATIONS

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Lieutenant, United States Navy
B.B.A., Memphis State University, 1976

This thesis is an historical analysis of Department of Defense budget trends, requests, and justifications for the period FY52 - FY84. Changes in GNP from year to year are compared to DoD outlay changes during this period to show the net change in DoD budget performance with respect to the wealth of the nation. Budget justifications are then analyzed for select years to determine if there is a trend in the different types of justifications advocated. This analysis determines how the posture of defense, its justifications, and surrounding environment are related with respect to the relative success of the budget submission.

Master of Science in Management
December 1985

Advisor: J.L. McCaffery
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DECISION-MAKING IN THE NAVY BUDGET OFFICE

James D. Smart
Commander, United States Navy Reserve
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Carl W. Schumaker
Lieutenant Commander, United States Navy
B.A., Pennsylvania State University, 1974

The primary objective of this thesis is to familiarize the reader with the budget decision-making processes and considerations which influence the formulation of the Department of the Navy's (DoN) budget from the following perspectives: the Office of Budget and Reports (OBR), and the impact of resource allocation (budgetary) decisions upon the overall framework within which DoN budgetary decisions are made. The organizational structures of the Office of the Comptroller of the Navy (NAVCOMPT) and the Office of Budget and Reports (OBR) are outlined and their respective duties and responsibilities are delineated.

Master of Science in Management
June 1986

Advisor: J.L. McCaffery
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FINANCIAL MANAGER INNOVATIONS: THE MEASUREMENT OF MANAGER TRAITS

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B.B.A., University of Texas at Arlington, 1971

It is hypothesized that there is a direct relationship between Naval Officer financial managers and the linker methodology of information transfer. The Professional Preference Census (PPC), a previously developed questionnaire, is used to determine the placement of Navy financial managers along the linker-stabilizer spectrum. A linker and stabilizer type of performance is defined and the methodology for measuring performance from the PPC is explained. Results obtained from the PPC are used in the formation of a working checklist for use in the field of financial management within the Navy. Emphasis is placed on the identification of personality traits that should prove helpful in the field of financial management.

Master of Science in Management
June 1986

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IN SEARCH OF COMBAT READINESS IN THE U.S. MARINE CORPS

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B.A., University of Missouri, Kansas City, 1974

This study is an analysis of the factors that make a U.S. Marine Corps unit combat ready. It focuses upon "resource" readiness factors and provides a general systems view of readiness of a MAGTF. It contains the results of a survey of 46 Marine officers, based upon a readiness model derived from the JCS UNITREP system. The survey data was analyzed using a Bootstrap methodology, whereby quantitative values are derived from qualitative value judgements.

Master of Science in Management
December 1985

Advisors: T.G. Swenson
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ANALYSIS OF BUDGET BEHAVIOR FOR THE U.S. COAST GUARD

Jeffrey Bruce Stark
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B.S., United States Coast Guard Academy, 1978

The Coast Guard was transferred to the Department of Transportation from the Treasury Department in 1967. Since joining the Transportation Department, the service has assumed several new additional responsibilities. This thesis analyzes the annual Coast Guard budgets and the service's participation in the government budget process during this period of rapidly growing responsibilities. The period 1967-1984 is emphasized in the study. Analysis of budget data during the period 1950-1966 is also done for comparative purposes. The budgets are broken into major components and specific budget behavior is identified. The Coast Guard's budget behavior is then compared with budget behavior from other services and agencies. A review of Congressional testimony involving Coast Guard funding is also accomplished. Statements summarizing the Coast Guard budget's behavior and how the service performs in the government budget process are made.

Master of Science in Management
December 1985

Advisor: J. McCaffery
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NAVY-FUNDED GRADUATE EDUCATION: DO THE NAVY AND URL OFFICER BENEFIT?

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This thesis investigates the benefits of investing in graduate education which accrue to both the Navy and the unrestricted line (URL) officer. Using historical data, survivor rates and time in rank between promotions are calculated for three cohort groups (Navy-funded Master's degree, non-Navy funded Master's degree, and non-Master). Statistical models are introduced to determine whether differences in survivor rates and time in rank are significant among the three comparison groups. The results show that differences in survivor rates and time in rank are statistically significant: Navy-funded graduate degree officers tend to stay in service longer and are promoted faster than either self-funded graduate officers or non-Master's degree officers.

Master of Science in Management
June 1986

Advisors: K.T. Marshall
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AN ANALYSIS OF THE STANDARD FINANCE SYSTEM (STANFINS)

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The United States Army accounting systems are the backbone of the Army's formal financial management system. They have evolved from manual systems to current automated processes, increasing in scope and complexity along the way. The current Standard Finance System (STANFINS) is the Army's most widely used installation accounting system. This thesis briefly traces its evolution and examines its current processes in order to determine how well STANFINS is supporting resource management with respect to both a fiduciary and managerial role. Additionally, this study determines STANFINS's future involvement in the Army's efforts to improve financial management.

Master of Science in Management
December 1985

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AN ANALYSIS OF DEPOT MAINTENANCE ANNUAL REPORTS

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B.S., Northern Michigan University, 1973

The objective of this thesis is to develop a feedback mechanism for the Department of Defense depot maintenance data tape submission process to the Office of the Assistant Secretary of Defense (Acquisitions and Logistics), (A&L). Several methods of data analysis, such as use of data tables, cost statements, trends, charts, ratios, and percentages are presented. These analysis methods are then combined to develop possible reports that could be sent to various levels of users, both in the Department of Defense and external to the Department of Defense. It is recommended that four separate reports be generated for the user groups and an annual report that can be used as a general report of the DoD depot maintenance system.

Master of Science in Management
March 1986

Advisors: S.L. Ansari
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SELECTIVE REENLISTMENT BONUSES: USED AS AN ALTERNATIVE TO CURRENT AND PROPOSED RETIREMENT PLANS

Robert S. Tallerico
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B.S., Weber State University, 1973

Congressional action to cut $2.9 billion from the FY 1986 DoD budget has settled the question of whether retirement benefits will be decreased. The decrease will affect only those individuals entering the services after the proposal is signed into law. The Pentagon is concerned with how this action will affect the attraction of new recruits and the retention of career personnel. Previous reviews of the retirement system have proposed reducing the annuities of the retiree as a method of reducing costs. A fully supported Selective Reenlistment Bonus (SRB) Program would reduce the costs of retirement while providing an adequate number of personnel to maintain national security. SRBs would provide incentive for career personnel in undermanned ratings to continue service. The desired savings can be attained by reducing the future annuities of overmanned ratings. To succeed there must be monetary offsets established during active duty to reduce the effects of lower retirement annuities. The political sensitivity of the retirement system and the large federal deficit will support retirement pay changes.

Master of Science in Management
December 1985

Advisor: D.R. Henderson
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COMPARATIVE EVALUATION OF THE IMPLEMENTATION OF THE DEFICIT REDUCTION ACT WITHIN THE DEPARTMENT OF DEFENSE

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B.B.A, West Georgia College, 1974

This thesis presents an evaluation of the armed services' plans to implement the cash management phase of the Deficit Reduction Act of 1984. This act follows the Debt Collection Act, Prompt Payment Act, Reform 88, and similar legislation designed to strengthen the control of federal funds, motivate government managers to handle cash more efficiently, and reduce the national deficit. The Deficit Reduction Act is an outgrowth of the President's Private Sector Survey on Cost Control (PPSSCC). This act authorizes the Department of the Treasury to prescribe regulations requiring agencies to implement the PPSSCC's recommendations for accelerating the billing, collection, and deposits of nontax federal receipts. Special attention is given to the higher echelon (Finance Centers) of the armed services who set policies and provide guidance to subordinate activities. The results indicate that the armed services are improving, but problems remain with implementing legislation and regulations.

Master of Science in Management
June 1986

Advisor: J.G. San Miguel
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AN EXPLORATORY ANALYSIS OF MISCONDUCT BEHAVIOR WITHIN THE RADIOMAN RATE AND ITS POTENTIAL EFFECT ON SECURITY

John Fred Teates
Lieutenant Commander, United States Navy
B.S., Southwest Texas State University, 1973

An exploratory analysis of misconduct discharges within the Radioman rate is conducted to determine whether these individuals constitute a potential threat to the security of classified information. Two aspects of personnel security examined are pre-service screening procedures and command administrative processes.

It is concluded that ASVAB scores and AFQT percentiles are not good predictors of security risks. Pre-service moral character behaviors and in-service interviews indicate something about an individual's attitude toward rules and regulations. There appears to be some inconsistency in the application of moral waiver standards. The administrative separation process is deliberate and structured. Commands that provide succinct and accurate recommendations for separation are responded to in a more timely manner.

Master of Science in Management
June 1986

Advisors: T.G. Swenson
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A STUDY OF THE PRACTICAL PROBLEMS OF THE DEPARTMENT OF DEFENSE'S PLANNING, PROGRAMMING, AND BUDGETING SYSTEM (PPBS)

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B.A., Hampton Institute, 1971
M.S. NOVA University, 1981

Planning, Programming and Budgeting (PPBS) has survived in the Department of Defense (DoD) for the better part of twenty-five years. It has not only endured, but by most accounts it has produced measurable improvements in the preparation of a credible budget for the defense establishment. However, in spite of budgeting advances experienced over this period as a result of PPBS, there continues to be problems with the system. This thesis attempts to offer a broader understanding of the significant and subtle factors of PPBS success in the DoD, by examining both the problems of the system which lead to the introduction of PPBS and also the problems created as a result of PPBS and its evolution of changes.

Master in Science in Management
June 1986

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PERFORMANCE WORK STATEMENT FOR AIR TERMINAL SERVICES

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Reliance on the private sector for commercially available services is a long-standing government policy. This policy is currently embodied in OMB Circular A-76. The formulation of a Performance Work Statement (PWS) is a critical part of the A-76 study process and becomes the key to success in specifying service requirements. This research examines the major problems encountered in developing a PWS and its conversion to contract technical specifications.

The study, through actual drafting of a PWS for Air Terminal Services, determined that the problems encountered in PWS formulation can be minimized by development of standardized, baseline PWS documents and permanent assignment of A-76 study teams at the command or area level. The PWS for Air Terminal Services included in the report provides the standardized, baseline PWS document for Navy-operated Military Airlift Command aerial ports.

Master of Science in Management
December 1985

Advisor: P.M. Carrick
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COMPONENT OBSOLESCENCE: PRESENTATION OF A DECISION PROCESS FOR ASSESSING AND SELECTING ALTERNATIVE SOLUTIONS APPLICABLE TO MAJOR WEAPON SYSTEMS PRODUCTION

Elizabeth Ann Tracy
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The capability of maintaining and sustaining military forces in peacetime deterrence and mobilization missions relies heavily upon the continued availability of system components. Advancing technology threatens operating system and production support as older system designs become increasingly dependent upon obsolete technology. This thesis focuses upon situations in which the contracting officer is informed by the prime contractor that a subcontractor no longer plans to continue manufacturing a particular component needed to support a major weapon system production line, and the alternative courses of action which can be taken when this occurs. The study defines the obsolescence problem and discusses why it occurs, describes current management initiatives and procedures to lessen the impact, identifies advantages and disadvantages associated with each alternative, and develops a formalized decision process for problem resolution.

Master of Science in Management
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Advisor: D.V. Lamm
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THE DUAL-CAREER HOUSEHOLD AND ITS EFFECTS ON SURFACE WARFARE OFFICER CAREER INTENT AND CAREER SATISFACTION

William D. Valentino, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

This study analyzes data from a survey of the Surface Warfare Officer community. The questionnaire was initiated by Navy Personnel Research and Development Center (NPRDC) in the summer of 1981. This thesis enhances the understanding of the effects of dual-careers and related family issues on surface warfare officer retention. Six theoretical measures are identified (household career status, family responsibility, grade, type duty, family disruptions, and family decision process), which are expected to explain the variance across career intent and career satisfaction. The study defines a dual-career family as a family in which husband and wife pursue careers that (a) both have professional-administrative-technical (PAT) jobs and (b) the relative proportion between the two incomes is between 60-40 and 50-50.

The findings show that both career intent and career satisfaction are influenced by the interaction of household career status, family decision process, grade and type duty. The study partly rejects the idea that the dual-career family trend in the Navy is a major problem. Additionally, the study raises questions for future research to address.

Master of Science in Management
December 1985

Advisor: W.J. Haga
Department of Administrative Sciences

A STUDY OF STRATEGIC PLANNING IN THE DEFENSE-ELECTRONICS INDUSTRY

Stephen Rogers Von Hitritz
Lieutenant, Supply Corps, United States Navy
B.S., University of Utah, 1978

In this study, the researcher examines long-range planning as practiced by certain companies in the defense-electronics industry.

The approach is: to determine an acceptable planning model to be used as a reference; to design a questionnaire from this reference model; and to visit selected companies with the questionnaire to obtain data. From an analysis of the data, a judgement is made concerning how long-range planning is practiced by the companies visited.

It is found that formal long-range planning is not as well established as one might conclude from the literature. Only two companies of the seven visited have employed long-range planning for longer than fifteen years. The planning of most of the companies fits the reference model; one major corporation's formal long-range plan does not. The difference is significant and is due to top management's concepts on formal planning. It is concluded that many companies are still attempting to determine how to best apply formal long-range planning.

Master of Science in Management
June 1986

Advisor: F.C. Horton
Department of Administrative Sciences

CHANGES IN NAVAL AVIATION BASIC INSTRUMENT FLIGHT TRAINING: AN ANALYSIS

James Young Wallace, III
Commander, United States Navy
B.S., University of North Carolina, 1969

To evaluate a modification to the Navy's Basic Instrument flight instruction, the performance of two groups of student aviators is compared. The modification consists of a lecture concentrating on the fundamentals of attitude instrument flight. One group of 100 students received the new training while a control group of 100 students did not. Analysis of the flight grades of the two groups reveal no significant difference in their performance. Based on the results of this research it is concluded that the modified basic instrument training did not improve the performance of student naval aviators. However, the modified lecture and training did improve the student's understanding of basic instrument fundamentals. The study recommends that the modified lecture should be continued as part of the syllabus because the benefits from affording the student aviators with additional training exceed the small costs involved.

Master of Science in Management
December 1985

Advisor: L.A. Armijo
Department of Administrative Sciences

A REVIEW OF THE "SHOULD COST" PROCESS AND MANAGEMENT ISSUES OF THE PROCESS

Robert L. Williams
Lieutenant, United States Navy
B.S., Embry-Riddle Aeronautical University, 1976

Should Cost Analysis has become a popular "catch-phase" with people involved with DoD major systems acquisitions in the 1980's. This analysis technique is generally recognized as an effective tool for the government in achieving cost reasonableness with negotiated contracts. In an attempt to enable acquisition managers to challenge contractor's costs, Congress has legislated the use of Should Cost analysis on major weapons systems. This research examines the Should Cost concept, capabilities of this technique, the Should Cost legislation, and presents several key management issues of Should Cost analysis. The research was conducted through a thorough literature search, supplemented by interviews with DoD and industry officials.

Master of Science in Management
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Advisor: R. Smith
Department of
Administrative Sciences

AN IMPLEMENTATION GUIDE FOR THE EXPERIMENTAL APPLICATION OF SUGGESTIVE-ACCELERATIVE LEARNING AND TEACHING TO THE COAST GUARD TRAINING ENVIRONMENT

James Dennis Williamson
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1976

This document addresses the compatibility of Suggestive-Accelerative Learning and Teaching (SALT) with two models of brain function, those of Program Structure (Proster) theory and Neuro-Linguistic Programming (NLP). The suggestive-based models for the acceleration of learning, Suggestopedia and Suggestive-Accelerative Learning and Teaching (SALT), are reviewed and the conclusion is drawn that the acceleration of learning, evidenced by the application of Suggestopedia and SALT, is due to their compatibility with brain function.

An implementation guide for the use of the SALT in the U.S. Coast Guard training environment is presented. An experimental design for the application of SALT to the U.S. Coast Guard Emergency Medical Technician School curriculum is proposed. Considerations for this application experiment are reviewed including: class schedule changes, course design, classroom set-up, instructor training requirements, and additional training equipment necessary for experimentation.

Master of Science in Management
June 1986

Advisor: R.A. McGonigal
Department of Administrative Sciences

BUDGET CONTROL AND EXECUTION IN THE FLEET MARINE FORCE

William Reynolds Wilson, IV
Captain, United States Marine Corps
B.A., The Citadel, Charleston, South Carolina, 1977

This thesis examines budget control and execution in the Fleet Marine Force. The past performance of selected major subordinate commands was examined for FY 85 and the budget officer of each command was interviewed. The information gained from the interviews, combined with the data gathered from the budgets and performance statements of the selected commands, reveal significant problems in control and execution. The PPBS process, the timing of the guidance received and issued, the use of ceilings and obligation rates as control measures, the Marine Air/Ground Financial Accounting and Reporting System, and the impact of the Marine Corps reward system on the conflict between the Marine Corps' philosophies of financial management and operational reality, are the main problem areas identified. This thesis examines these problems, their impact on budget control and execution, and makes specific recommendations to reduce and/or resolve them.

Master of Science in Management
June 1986

Advisor: J.L. McCaffery
Department of Administrative Sciences

MANNING THE READY RESERVE FORCE: A STUDY OF THE AVAILABILITY OF U.S. MARITIME LABOR TO MAN THE READY RESERVE FORCE

Mary Theresa Winger
Lieutenant, United States Navy
B.S.I.M., Purdue University, 1978

This thesis studies the U.S. maritime labor force as it affects the manning of the Ready Reserve Force (RRF). The focus is on the reasons for periodic variations in the labor supply within the U.S. maritime industry. The amount of labor that will be needed to man a fully-activated RRF is compared with the amount of labor predicted to be available to the RRF and the commercial world. The RRF will require about 16 percent of the predicted available labor force. Shortages are bound to occur, especially in light of past history. Recommendations to minimize the amount of shortages include: instituting better union personnel management practices; assignment of personnel on a nationwide rather than local basis; and pooling of union resources to meet emergencies. It is also recommended that DoD develop its own backup source of officers to man RRF ships through an extended Merchant Marine Reserve program.

Master of Science in Management
December 1985

Advisor: M.J. Eitelberg
Department of
Administrative Sciences

CAPITAL EQUIPMENT ACQUISITION PROCEDURES FOR ENHANCING PRODUCTIVITY AT PWC SAN FRANCISCO

Douglas Arthur Wolfe
Lieutenant, Civil Engineer Corps, United States Navy
B.C.E., Villanova University, 1980

The purpose of this thesis is to detail the management control process as related to the Productivity Program at Navy Public Works Center (PWC) San Francisco, California. The Department of Defense (DoD) and Navy programs provide a broad framework within which all PWCs have developed their own unique Productivity Programs. The Asset Capitalization Program (ACP) has provided industrial fund activities like PWCs with the means of implementing the productivity strategy. In particular, the Capital Equipment Investment Plan establishes a systematic approach in the substitution of capital equipment for labor with enhanced productivity a desired result. With such a plan, PWC San Francisco has been able to achieve revitalization and modernization of capital assets. However, there are weaknesses in the planning and acquisition procedures which have been identified and which require management attention.

Master of Science in Management
December 1985

Advisors: D.C. Boger
K.J. Euske
Department of Administrative Sciences

REPORTS TO CONGRESS RELATIVE TO MAJOR WEAPON SYSTEMS ACQUISITION: THEIR IMPACT ON THE ACQUISITION PROCESS

Virginia L. Wydler
B.S., University of Maryland, 1984

This study examines the recurring Congressional report requirements for Defense weapon systems and how that information is used in Congressional oversight.

The study reviews the acquisition and budget processes and addresses the Selected Acquisition Report (SAR), the Unit Cost Report (UCR), and the Acquisition Strategy Report legislated by Congress. The study further examines the use of the report data by Government agencies and presents problems and recommended changes identified by those users.

The researcher found that there is no other management reporting system available which presents information in the detail and form as the SAR and UCR. However, that documentation can be improved through correction of inconsistencies, streamlining and automation. The Acquisition Strategy Report is a compliance report to ensure enhanced competition reduces cost and shows no potential expansion through legislation.

Master of Science in Management
September 1986

Advisor: D.V. Lamm
Department of
Administrative Sciences

MASTER OF SCIENCE

IN

MECHANICAL ENGINEERING

A CALORIMETRIC STUDY OF THE MICROSTRUCTURES OF A THERMOMECHANICALLY PROCESSED AL-10.0% MG-0.1% ZR ALLOY

James N. Andrews, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

Differential scanning calorimetry (DSC) was used to investigate microstructure evolution in a high-magnesium aluminum-magnesium alloy, Al-10.0% Mg-0.1% Zr, which had been thermomechanically processed. The two variations of the thermomechanical processing (TMP) investigated resulted in an extremely fine grain size, one the preconditions for superplastic deformation. The DSC results were consistent with previous research indicating continuous recrystallization occurs during annealing and deformation at relatively low temperatures. Additional insight into the development of the microstructure produced by the two TMP variations was obtained, especially with regard to the intermetallic β-Phase. The DSC study also showed that a morphological difference exists in the microstructures produced by the two TMP variations used, and transmission electron microscopy (TEM) results confirmed these differences.

Master of Science in
Mechanical Engineering
September 1986

Advisor: T.R. McNelley
Department of
Mechanical Engineering

AN INVESTIGATION INTO THE TRIPPING BEHAVIOR OF LONGITUDINALLY T-STIFFENED RECTANGULAR FLAT PLATES LOADED STATICALLY AND IMPULSIVELY

Howard L. Budweg
Lieutenant, United States Navy
B.S., University of Oregon, 1977

An experimental investigation was conducted to determine the static and dynamic responses of a specific stiffened flat plate design. The air-backed rectangular flat plates of 6061-T6 aluminum with an externally machined longitudinal narrow-flanged T-stiffener and clamped boundary conditions were subjected to static loading by water hydropump pressure and shock loading from an eight pound TNT charge detonated underwater. The dynamic test plate was instrumented to measure transient strains and free-field pressure. The static test plate was instrumented to measure transient strains, plate deflection, and pressure. Emphasis was placed upon forcing static and dynamic stiffener tripping, obtaining relevant strain and pressure data, and studying the associated plate-stiffener behavior.

Master of Science in
Mechanical Engineering
March 1986

Advisor: Y.S. Shin
Department of
Mechanical Engineering

A CORRELATION FOR THE HEAT TRANSFER COEFFICIENT IN A RECTANGULAR PASSAGE CONTAINING PROTUBERANCE

Ceyhun Cesur
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1980

An experimental investigation was carried out to determine the effect on the convective heat transfer coefficient of protuberances in a rectangular passage.

A cross-flow compact type heat exchanger formed by several parallel spaced plates including protuberances was tested by using water, glycol and air as a working fluid. Heat transfer coefficient data was obtained by measuring mass flow-rate, temperature and pressure drops across the heat exchanger.

Heat transfer characteristics are discussed and correlations for Nusselt number, Colburn factor and friction factor have been obtained.

Master of Science in
Mechanical Engineering
September 1986

Advisor: A.D. Kraus
Department of
Mechanical Engineering

A PARAMETRIC STUDY OF ELASTIC RESPONSE OF SUBMARINE-INSTALLED EQUIPMENT SUBJECTED TO UNDEX SIDE-ON LOADING

Gerald Francis DeConto
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

It is desirable to perform a study of the elastic responses of submarine hulls and internally attached structures to underwater shock loading. In view of the expense and possible involvement of non-shock testable equipment it is not always desirable to perform actual shock tests utilizing real hulls or SSTV's (Submerged Shock Test Vehicles). With the advent of large scale computing power, numerical methods now exist to predict equipmont/hull responses. The ELSHOK, (ELASTIC SHOCK) computer code is used to perform a parametric study on a submerged shell with an internally attached substructure. Of particular interest is the phenomenon of dynamic amplification or lack of such in the response of this particular substructure and effects on substructure-shell interaction due to varying substructure mass and stiffness subjected to underwater explosion side-on shock loading.

Master of Science in
Mechanical Engineering
March 1986

Advisor: Y.S. Shin
Department of
Mechanical Engineering

AN INVESTIGATION OF THE OXIDE ADHESION AND GROWTH CHARACTERISTICS ON PLATINUM MODIFIED ALUMINIDE COATINGS

Margaret Shannon Farrell
Lieutenant, United States Navy
B.A., Villanova University, 1980

The operating environment for superalloy blades and vanes in gas turbine engines has necessitated the development of alloy coatings to achieve satisfactory resistance of the metal to oxidation and hot corrosion. Aluminide coatings were initially developed to meet this need. Recently it has shown that platinum additions significantly improve the oxidation resistance of these aluminide coatings. The effects of pre-aluminizing surface smoothness and coating structure for both platinum modified and unmodified aluminide coatings on IN-738 in a cyclic oxidation environment at 1100°C were examined. Weight change measurements were used to determine the coating oxide scale adherence characteristics and to quantify the cyclic oxidation behavior of the various coating structures.

Master of Science in
Mechanical Engineering
September 1986

Advisor: D.H. Boone
Department of
Mechanical Engineering

EXPERIMENTAL INVESTIGATION OF TURBULENT HEAT TRANSFER IN STRAIGHT AND CURVED RECTANGULAR DUCTS

George Gregory Galyo
Lieutenant, United States Navy
B.S., United States Naval Academy, 1980

An experimental apparatus has been constructed and tested to examine the convective heat transfer in straight and curved ducts of rectangular cross-section. The channel can be configured with both walls independently heated at a constant heat flux, or one wall at a constant heat flux and the opposite wall adiabatic. Local and average Nusselt numbers can be calculated, and used to evaluate the effect of curvature on heat transfer.

Experiments were conducted at steady state for turbulent flow with one wall heated at a constant heat flux and the opposite wall adiabatic. The heat transfer characteristics of the straight and curved sections, on both the inner and outer walls, were compared. The heat transfer rate of the concave curved wall proved to be enhanced over both the convex curved wall and both straight sections.

Master of Science in
Mechanical Engineering
December 1985

Advisor: M.D. Kelleher
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Mechanical Engineering

THE FEASIBILITY OF SHIFTING SMALL PURCHASE WORKLOAD BETWEEN NAVY FIELD CONTRACTING ACTIVITIES

Geoffrey M. Gannaway
Lieutenant Commander, United States Navy
B.A., College of Artesia, 1970

The research focuses on those factors considered critical to making a decision for shifting small purchase workload between contracting activities of the Naval Supply Systems Command. The results of this study indicate that it is feasible to transfer small purchase workload under certain conditions. The primary factors to optimize customer response time are: (1) can the requirement be procured through an existing Basic Ordering Agreement (BOA), Blanket Purchasing Agreement (BPA), or automated Request For Quotations (RFQ); (2) technical complexity; (3) purchase priority; (4) receiver of the shifted workload; (5) customer; (6) proximity of the contracting activity to the customer and supplier; and, (7) age of the document. It is recommended that small purchase documents be shifted among Navy Field Contracting System activities as a viable means for improving overall customer response time.

Master of Science in Management
December 1985

Advisor: R.W. Smith
Department of
Administrative Sciences

AN ANALYSIS OF THE PERFORMANCE OF A VERTICALLY ORIENTED, GAS LOADED, VARIABLE CONDUCTANCE HEAT PIPE

Grey A. Glover
Lieutenant Commander, United States Navy
B.A., Youngstown State University, 1971

An analysis of steady state operation of a vertically oriented, variable conductance heat pipe is presented. The effects of binary mass diffusion, axial pipe wall conduction, and gravitational effects, caused by the difference in molecular weight of the non-condensible gas and the working fluid are incorporated. Analytical expressions for the conservation of mass, momentum, and energy are combined along with equations of state to describe steady state operation of the heat pipe. These expressions are combined to form a system of three differential equations with three unknowns; working fluid vapor velocity, mass fraction, and temperature. These equations are nondimensionalized and an iteration scheme for numerical solution of the equations is presented.

Master of Science in
Mechanical Engineering
March 1986

Advisor: M.D. Kelleher
Department of
Mechanical Engineering

TWO-DIMENSIONAL HEAT CONDUCTION IN METAL, FLUID COMPOSITES

Michael Andrew Gomori
Lieutenant, United States Navy
B.S., Fairleigh Dickenson University, 1979

Filmwise condensation of steam on externally-finned tubes is a complex process. Recent experiments have shown that enhancement ratios (ratio of steam-side heat-transfer coefficient to that of a smooth tube having the same diameter) exceeded the area enhancement produced by the fins. Moreover, the enhancement ratios for fully flooded tubes exceeded the values predicted by a simple, one-dimensional conduction model by a factor of 2 to 4. A new two-dimensional conduction model was developed, which showed that the one-dimensional model overpredicted the two-dimensional results for high conductivity tube-metals such as copper by as much as 13%. The two-dimensional model also showed that variations in fin thickness or spacing can result in an overprediction by the one-dimensional model of the two-dimensional results by as much as twenty-two percent.

Master of Science in
Mechanical Engineering
December 1985

Advisors: A.D. Kraus
A.S. Wanniarachchi
Department of
Mechanical Engineering

THE EFFECT OF THERMOMECHANICAL PROCESSING VARIABLES ON DUCTILITY OF A HIGH-MG, AL-MG-ZR ALLOY

William H. Grider, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

In previous research on thermomechanically processed high - Mg, Al - Mg alloys, yield strengths of 276 MPa (40 ksi) were retained after simulated superplastic forming, but ductility at ambient temperature varied from one to fourteen percent elongation in tension testing. This variability in ductility was studied in a series of experiments conducted on an Al-10%Mg-0.1%Zr alloy. Study by light microscopy and scanning electron microscopy revealed defects resulting from inverse segregation in the original casting and also defects resulting from the relatively light reductions utilized in the warm rolling of the material. The use of heavier reductions in rolling was shown to improve tensile ductility at ambient temperature both in the as-rolled and annealed conditions. Superplasticity in material processed using such heavier reductions in rolling was then studied by tension testing at 300°C.

Master of Science in
Mechanical Engineering
June 1986

Advisor:. T.R. McNelley
Department of
Mechanical Engineering

RETAINED AMBIENT TEMPERATURE PROPERTIES OF SUPERPLASTICALLY DEFORMED AL-10%MG-0.1%ZR, AL-10%MG-0.5%MN AND AL-10%MG-0.4%CU ALLOYS

Karl A. Klankowski
Lieutenant, United States Navy
B.S., University of New Mexico, 1978

The room temperature mechanical properties of three superplastic high-Magnesium, Aluminum-Magnesium alloys (al-10Mg-0.1Zr, Al-10 Mg-0.5Mn, Al-10Mg-0.4Cu) were evaluated after simulated superplastic forming at warm temperature. The alloys were initially processed to produce superplastic response. They were then deformed at 300 C to strains of 100 to 200% at strain rates of $1.7X10^{-3}S^{-1}$ or $1.7X10^{-2}$ S^{-1} and samples remachined for ambient temperature testing. Results indicate yield strengths of about 276 Mpa (40 KSI) are attainable with ductility varying from about 1 to 14 percent elongation at fracture. Ultimate strengths correspondingly vary up to about 517 MPa (75 KSI). Origin of the variability in ductility is considered.

Master of Science in
Mechanical Engineering
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Advisor: T.R. McNelley
Department of
Mechanical Engineering

PLASTIC INSTABILITY OF PLATINUM MODIFIED AND UNMODIFIED ALUMINIDE COATINGS DURING 1100 C CYCLIC TESTING

Margaret Ann McCloskey
Lieutenant, United States Navy
B.S., Belmont Abbey College, 1977

In a study conducted at the Naval Postgraduate School on the effect of cyclic oxidation at 1100 C on platinum modified and unmodified aluminide coated nickel base superalloy (IN-738), a surface deformation described as rumpling was first reported. Rumpling was found to be a function of the number and type of thermal strain cycles, thermal expansion mismatch, coating strength and coating thickness. Further testing to determine the mechanical and protectivity impact of rumpling has been conducted. In addition, a concurrent study of the β(NiAl) phase degradation was undertaken.

Master of Science in
Mechanical Engineering
September 1986

Advisor: D.H. Boone
Department of
Mechanical Engineering

THE VARIATION OF SUBGRAIN MISORIENTATION IN ALUMINUM WITH LARGE STEADY-STATE CREEP STRAIN

Michael E. McMahon
Lieutenant, United States Navy
B.S., University of Colorado, 1979

High purity aluminum was torsionally deformed to various strains up to 16.33 at a temperature of 644 K in this study. The variation in the dislocation substructure was determined with increasing strain. Recent work revealed that both the subgrain size and density of dislocations not associated with subgrain boundaries remained constant over the range of steady-state strains examined. However, transmission electron microscopy in this work revealed that subgrain boundaries undergo two types of basic changes during steady-state creep. At the onset of steady-state behavior ($\varepsilon = 0.20$), all subgrain boundaries had small misorientations, typically, 0.6^{o}. The misorientation across boundaries formed as a result of dislocation accumulation continued to increase well past steady-state up to a strain of about 1.2, where a maximum average value of 1.2^{o} was observed. This suggests that the dislocation spacing in subgrain boundaries is not principally responsible for the creep resistance during five power-law creep. At strains greater than about four, nearly a third of the subgrain boundaries were determined to be high angle boundaries (HAB). Polarized light microscopy revealed that the large fraction of HAB's observed was a result of a geometric dynamic recrystallization consistent with that discussed by McQueen and coworkers. The boundaries formed from dislocation reaction rarely develop misorientations greater than 3^{o}. The increased presence of the high angle boundaries during steady-state where a constant subgrain size and constant forest dislocation density structure are observed also suggests that the misorientation of subgrains is not an important microstructural feature.

Master of Science in
Mechanical Engineering
June 1986

Advisor: M.E. Kassner
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Mechanical Engineering

NUCLEATE POOL-BOILING OF R-114 REFRIGERANT AND OIL MIXTURES FROM WATER-HEATED ENHANCED SURFACES

Stephen M. McManus
Lieutenant, United States Navy
B.S.Ch.E., University of New Mexico, 1979

Heat-transfer measurements were made for a single, water-heated tube in a pool of R-114 to simulate operating conditions of a water chiller. Data were obtained for a smooth copper tube, and for two commercially available tubes: a spirally roped copper-nickel tube with a porous coating; and a copper tube with a structured outer surface and a multiple-start helical ridged inner surface. Measurements were made for refrigerant-oil mixtures at oil concentrations from 0 to 6 mass percent with a boiling pool temperature of 13.8°C. Results for the two enhanced tubes with and without oil are compared to the smooth tube data. Enhancement factors for the overall heat-transfer coefficient were 4.0 and 3.6 for the structured surface and porous-coated tubes, respectively, in pure refrigerant and at a water velocity of 2 m/s. For these same conditions the enhancement factors for the outside heat-transfer coefficient were 14.6 and 6.4 for the porous-coated and structured surface tubes, respectively.

Master of Science in
Mechanical Engineering
June 1986

Advisors: P.J. Marto
A.S. Wanniarachchi
Department of
Mechanical Engineering

STRUCTURAL PROPERTY EFFECTS FOR PLATINUM MODIFIED ALUMINIDE COATINGS

Lawrence G. Newman
Lieutenant Commander, United States Navy
B.S., Auburn University, 1975

Aluminide and platinum modified aluminide coatings have proven to be effective and economical means of protecting gas turbine components from oxidative and corrosive attack. In order to maintain coating integrity, the response of the coating - substrate system to strains imposed by thermal expansion mismatch and external stresses must be known. Selected coating systems were examined on an IN 738 substrate to determine the ductile to brittle transition temperature (DBTT) and the residual strains caused by the presence of the coating. The coating morphology was examined by scanning electron microscopy and electron probe microanalysis, and correlations between coating microstructure and DBTT were established.

Master of Science in
Mechanical Engineering
September 1986

Advisor: D.H. Boone
Department of
Mechanical Engineering

EFFECT OF THERMOMECHANICAL PROCESSING ON THE ELEVATED TEMPERATURE BEHAVIOR OF LITHIUM-CONTAINING HIGH-MG, AL-MG ALLOYS

Stephen B. Olster
Lieutenant Commander, United States Navy
B.U.S., University of New Mexico, 1975

An experimental investigation was conducted to determine the mechanical properties and microstructural characteristics resulting from thermomechanical processing by warm rolling of an Al-8.0%Mg-0.5%Li-0.15%Zr alloy and an Al-8.0%Mg-1.0%Li-0.15%Zr alloy. At ambient temperature, yield strengths were 38 to 44 Ksi (262-303 MPa), ultimate tensile strengths were 60 to 65 Ksi (414-450 PMa), with 10-12% elongation to fracture. Both alloys were moderately superplastic at 300°C; an elongation of 340% was attained with the 1.0%Li alloy. Behavior of the alloy is consistent with continuous recrystallization during annealing and deformation at warm temperatures, and is very similar to that of previously studied Al-Mg-X alloys.

Master of Science in
Mechanical Engineering
June 1986

Advisor: T.R. McNelley
Department of
Mechanical Engineering

ANALYSIS OF COMBUSTION OF A POROUS MEDIUM

Do Sung Park
Lieutenant Commander, Republic of Korea Navy
B.S., Korea Naval Academy, 1975

A numerical analysis of a heat transfer and combustion model for a porous medium within a circular cylinder is carried out. The basic mechanisms considered in the theory are: a carbon energy conservation equation, energy balance on the air, and an oxygen mass balance equation. Heat transfer mechanisms included in the model are conduction, convection, and radiation. A heat generation term arising from combustion of the carbon is included in the model. Transport mechanisms for oxygen mass transfer are molecular diffusion and convection transport. The governing heat and mass transfer equations are solved numerically by the Galerkin formulation of the Finite Element Method. The results show the effects of permeability, prosity, geometry and initial condition on the behavior of the system.

Master of Science in
Mechanical Engineering
December 1985

Advisor: D. Salinas
Department of
Mechanical Engineering

HEAT TRANSFER FROM AN ARRAY OF HEATED CYLINDRICAL ELEMENTS ON AN ADIABATIC CHANNEL WALL

James D. Platt, Jr.
Lieutenant, United States Navy
B.A., State University of New York at Geneseo, 1980

This thesis describes an experimental study of the fluid dynamics and heat transfer characteristics of Laminar air flow acro:s cylindrical elements mounted on one wall of a vertical adiabatic channel. Various combinations of approach velocity and channel width were employed and the variations of the row by row heat transfer coefficients between elements of the array and the air stream were determined.

Master of Science in
Mechanical Engineering
September 1986

Advisor: A.D. Kraus
Department of
Mechanical Engineering

THE EFFECTS OF OIL CONTAMINATION ON THE NUCLEATE POOL-BOILING BEHAVIOR OF R-114 FROM ENHANCED SURFACES

Lloyd Merrill Sawyer, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

The external nucleate pool-boiling heat-transfer coefficient of both smooth and enhanced horizontal tubes in R-114-oil mixtures (0 to 10 mass percent oil) were measured for heat fluxes from 1 to 91 kW/m^2 at a saturation temperature of 2.2 C. The enhanced tubes tested were a Wieland GEWA-T finned tube containing 1.02 fins/mm, a Hitachi Thermoexcel-E and a Hitachi Thermoexcel-HE tube. The Thermoexcel-E and -HE tubes with their re-entrant cavity designs were found to improve the heat-transfer coefficient over the smooth tube value at a constant heat flux by a factor of approximately 7 in oil-free R-114, while the GEWA-T tube improved the coefficient by a factor of about 4. At a practical heat flux of about 30 kW/m^2 with 3 percent oil, the GEWA-T. Thermoexcel-E and Thermoexcel-HE tubes outperformed the smooth tube by factors of 4.8, 4.6 and 4.0, respectively.

Master of Science in
Mechanical Engineering
June 1986

Advisor: P.J. Marto
Department of
Mechanical Engineering

EFFECTS OF VARIABLE PROPERTIES IN FILM COOLED TURBULENT BOUNDARY LAYERS

Alfred F. Walz, Jr.
Lieutenant Commander, United States Navy
B.S., Maine Maritime Academy, 1977

The effects of variable properties on heat transfer in a film cooled turbulent boundary layer were investigated. A new procedure was developed to deduce adiabatic effectiveness from heat transfer coefficients based on the wall to freestream temperature difference, where both are representative of variable property flow conditions. The new technique was shown to be valid using data from the literature for injection into a turbulent boundary layer from one and two rows of injection holes. From these results, the variation of the coolant to mainstream density ratio was shown to have a significantly greater effect on heat transfer than variations of viscosity and thermal conductivity.

Master of Science in
Mechanical Engineering
March 1986

Advisor: P.M. Ligrani
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Mechanical Engineering

A PARAMETRIC STUDY OF ELASTIC RESPONSES OF SUBMARINE-INSTALLED EQUIPMENT WHEN SUBJECTED TO UNDEX END-ON LOADING

Stephen Allen Weinhardt
Lieutenant Commander, United States Navy
B.S., Purdue University, 1975

Due to the lack of longitudinal stiffening along submarine hulls, they are inherently vulnerable to underwater explosions directly off the bow or stern. Accordion-like deformations of the hull are set into motion which could cause dynamic amplification in the transient response of attached substructures. In underwater shock acceptance tests of internal equipment, this interaction is created by exploding a charge in a fore and aft configuration with the submerged shock test vehicle (SSTV). With the increasing availability of large computers and the rapid development of numerical methods, several computer codes have been written to predict equipment response to underwater shocks. Using the ELSHOK (ELASTIC SHOCK) code, this investigation studies the effect of hull/substructure interaction on stiffened shell response at resonance following an end-on load. The transient response of the coupled shell/substructure system from tapered and conventional charges of equivalent impulse is examined in this study.

Master of Science in
Mechanical Engineering
March 1986

Advisor: Y.S. Shin
Department of
Mechanical Engineering

THE VARIATION OF THE DISLOCATION DENSITY IN ALUMINUM DEFORMED TO LARGE STEADY-STATE CREEP STRAINS

T. Scott Wetter
Lieutenant, United States Navy
B.A., University of Illinois, 1977

This thesis reports trends in the variation of the subgrain size and density of dislocations not associated with subgrain boundaries (forest dislocations) in high purity aluminum with strain during primary and steady-state creep at temperatures in the power-law regime utilizing torsional deformation. Any microstructural feature responsible for strength is expected to be constant during steady-state deformation. Earlier work addressed changes in the subgrain size over a wide range of steady-state strain. A constant subgrain size was found. The present effort primarily examined the dislocation density but also further evaluated the conclusion of a constant subgrain size during steady-state. The subgrain size data were found consistent with the earlier work. In contrast to constant-stress tests in other investigations, it was found, here, that the forest dislocation density monotonically increased until a steady-state at approximately $\varepsilon = 0.20$. The forest dislocation density is essentially constant at steady-state. These two findings are consistent with dislocation network theories for creep. Optical micrographs were taken from tangential sections of the torsion samples, which substantiated the finding that the subgrain size is fixed during steady-state.

Master of Science in
Mechanical Engineering
March 1986

Advisor: M.E. Kassner
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Mechanical Engineering

HOT CORROSION BEHAVIOR OF MODIFIED ALUMINIDE COATINGS ON COBALT-BASE SUPERALLOYS

Muhammad Yasin
Lieutenant Commander, Indonesian Navy
B.S., Naval Academy, 1970
M.E., Naval Institute of Science, 1979

Marine gas turbines experience a number of detrimental operating conditions as a result of environment and fuel variation. There are two types of hot corrosion which occur in marine and other types of gas turbines known as low temperature hot corrosion and high temperature hot corrosion. Protective coatings are necessary and have been widely used to improve hot corrosion resistance for superalloys operating in this environment. Considerable data can be obtained from the literature on systems applied to nickel-base superalloys while little data are available on similarly coated cobalt-base superalloys. This study was initiated to evaluate the behavior of modified coatings on a series of cobalt-base superalloys in both high and low temperature hot corrosion.

Master of Science in
Mechanical Engineering
June 1986

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HEAT TRANSFER MODELLING OF THRUST VECTOR CONTROL SYSTEMS

Alp Yukselen
Lieutenant JG, Turkish Navy
B.S., Turkish Naval Academy, 1979

This thesis presents a model of heat transfer phenomenon in thrust vector control systems, using the PHOENICS computer code.

To simplify the problem of heat transfer to solid objects in rocket exhaust, simple wedge bodies have been examined in supersonic gas flow for both turbulent and laminar flow cases.

The study gives an estimate of skin friction coefficient, surface heat flux, heat transfer coefficient, Stanton number distributions, and computer run times.

Master of Science in
Mechanical Engineering
March 1986

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MASTER OF SCIENCE

IN

METEOROLOGY

THREE-DIMENSIONAL DISPLAY OF SYNOPTIC-SCALE WEATHER DATA

Robert F. Crosby
Captain, United States Air Force
B.S., Southern Illinois University, 1981

This thesis develops a technique for the three-dimensional (3-D) display of clouds, topography and atmospheric surfaces on an image and graphics analysis system. Cloud heights were estimated from infrared satellite imagery. Software was written to translate two-dimensional gridded data height fields into gray shade images. Existing 3-D display software was modified to use the data images as input. Potential temperature and 500 mb surfaces are prescnted as examples of possible fields for analysis in 3-D. The software was further modified to expand the geographical area enclosed in the final 3-D images. These images were used to produce 3-D displays of topography, clouds and atmospheric parameters. The relationships between atmospheric surfaces and cloud structures can be more clearly seen in the 3-D representations. With modifications to increase the resolution of the 3-D displays, improved understanding of the atmosphere can be expected.

Master of Science in
Meteorology
June 1986

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AN EXAMINATION OF RADIATION IN AN INTEGRATED MARINE ATMOSPHERIC BOUNDARY LAYER MODEL

Steven B. Dreksler
Captain, United States Air Force
B.S., University of Maryland, 1977

An integrated marine atmospheric boundary layer (MABL) model is evaluated relative to its ability to estimate longwave and shortwave radiation. The model is initialized and verified using data taken during the 1983 Mixed Layer Dynamics Experiment (MILDEX). Model computations of shortwave and longwave radiation are compared with measurements made during both atmospheric frontal and non-frontal situations. The model results did not always agree with the measurements but reasons for them seem to be known and are discussed. One problem is that the MABL model only predicts clouds in the boundary layer and does not consider upper clouds. This led to most of the major differences. Further development of the model with upper-layer cloud specifications is needed to overcome the major differences encountered in this evaluation.

Master of Science in
Meteorology
June 1986

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CLEAR AIR TURBULENCE ANALYSIS USING ISENTROPIC METHODS

John H. Jacobson
Captain, United States Air Force
B.S., North Carolina State University, 1980

Isentropic analyses were completed subjectively and by the Petersen (1986) objective analysis scheme for a 24-h Clear Air Turbulence (CAT) outbreak over the midwest United States. The purpose of the study is to determine if areas of high CAT potential could be identified by subjective isentropic analyses, and then by the automated analyses produced by the Petersen objective analyses. A background of CAT theory and current CAT forecasting techniques are also presented. The synoptic situation indicates the importance of the jet stream structure in this case. The study reveals that analyzed areas of low Ri and high wind shear correspond very well to reports of CAT. The objective analysis performance is fair overall. It shows a distinctive weakness in the analysis of the wind speed, occasionally producing spurious wind maxima. Analyses of the mass field, frontal slope and Montgomery stream function, are quite successful.

Master of Science in
Meteorology
March 1986

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RELATING THE DISTRIBUTIONAL CHARACTER OF NUMERICAL MODEL OUTPUT PARAMETERS TO THE OCCURENCE OF FOG OVER THE NORTH ATLANTIC OCEAN

Oliver J. Muldoon
Captain, United States Air Force
B.S., University College, Galway, Ireland, 1970

This report describes an investigation into the statistical distributional of six model output parameters from Fleet Numerical Oceanographic Center's Navy Operational Global Atmospheric Prediction System, as a function of the occurrence of Fog and No Fog for a climatologically homogeneous area of the North Atlantic Ocean in the summer season. Beta, Normal and Gamma distributions were fitted to these parameters and forecasts of Fog and No Fog were made using Bayes' Law. Intercomparisons were made of these forecasts, using various categorical scoring systems (Threat Score, Percentage Correct, False Alarm, Forecast Reliability and Power of Detection), as well as a probabilistic scoring system (Penalty-Reward-Score). The forecast results were examined for significant differences using an Anova analysis. It is confirmed that predictor populations whose underlying distributions are of an exponential form are much better represented by a Beta or Gamma distribution than by a Normal. For predictors whose distributions are roughly bell-shaped, it is indicated that the Beta distribution can be generally used as a proxy for the Normal, as can the Gamma also. However, in some cases the Normal distribution results in better forecast scores, and the decision on use of a proxy would depend on which of the scores is to be emphasized.

Master of Science in
Meteorology
June 1986

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APPLICATIONS OF WIND EMPIRICAL ORTHOGONAL FUNCTIONS IN TROPICAL CYCLONE MOTION STUDIES

Thomas B. Schott
Captain, United States Air Force
B.S., South Dakota State University, 1976

An empirical orthogonal function (EOF) analysis is used to represent environmental wind fields associated with selected western North Pacific tropical cyclones from 1979-1983. Composite synoptic patterns within five past-motion categories of cyclones are studied using 5, 10, 20 and 35 EOF modes. Significant differences in the composite fields are found between categories, which suggests that the wind EOFs are capable of representing synoptic patterns associated with tropical cyclone motion. Regression equations are developed to post-process the forecast track of the One-way Tropical Cyclone Model (OTCM). The predictors for the regression analysis include the EOF coefficients, past motion, storm position, date, intensity, backward extrapolation and forward track displacements. For the dependent sample, the mean 72-h track forecast error for the modified OTCM is 383 km, which represents a 210 km improvement relative to the unmodified OTCM. Thus, the regression scheme has great potential for operational application.

Master of Science in
Meteorology
December 1985

Advisors: R.L. Elsberry
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Meteorology

GEOSTATIONARY SATELLITE ANALYSES OF PRECIPITATION AND CLOUD PARAMETERS

Laura A. Spray
B.S., University of Wisconsin, Madison, 1983

Satellite and surface data are utilized to analyze mesoscale and subsynoptic cloud and precipitation patterns. Digital GOES (Geostationary Operational Environmental Satellite) visible and infrared data are used to produce high resolution (4 n mi) satellite analyses of cloud amount, cloud type, cloud-top temperature and height and precipitation intensity for an approximate 1600 x 1600 n mi area over the northeastern United States and the western North Atlantic. Conventional surface observations, the ARS (Automated Radar Summary) chart and manual analysis of the imagery are used to evaluate the satellite-derived analyses for nine cases during the winter and spring 1985.

The majority of cloud amount estimates for clear and overcast sky conditions are analyzed correctly; however, broken and scattered skies are underestimated. The general cloud type patterns are depicted accurately. More success occurs with uniform-textured clouds (i.e. nimbostratus, stratocumlus) and multi-layered clouds than with nonuniform-textured clouds (i.e. cirrus, cumulus). The majority of cloud-top temperature/height analyses are representative of the cloud types and patterns. Most precipitation areas are identified correctly; however, the intensity of the precipitation is underestimated.

Master of Science in Meteorology
December 1985

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Department of Meteorology

MASTER OF SCIENCE

IN

METEOROLOGY AND OCEANOGRAPHY

DETERMINATION OF THE ATMOSPHERIC AEROSOL DISTRIBUTION BY MULTI-CHANNEL REMOTE SENSING TECHNIQUES

Scott R. Bulfinch
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1970

A simple image processing technique applied to channel 1 and channel 2 of the NOAA AVHRR sensor may be used to discern variations in aerosol particle size distribution. Ratios of the channel 1 albedo to the channel 2 albedo are calculated and displayed as an image. High ratio values are shown to indicate increased levels of submicron aerosols, while low ratio values indicate increased levels of supermicron aerosols. Horizontal variations in aerosol distributions may be observed directly by noting variations in ratio values, and vertical distributions may be inferred through the application of appropriate regional models of aerosol transport. A model of offshore advection of urban particles within the marine boundary layer is presented. Interpreting ratio values in light of this model, the offshore transport of urban aerosol particles is observed in AVHRR imagery of southern California during the period 17-25 October 1984.

Master of Science in
Meteorology and Oceanography
March 1986

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INVESTIGATION OF HIGH AND LOW PREDICTABILITY PERIODS IN MEDIUM RANGE FORECASTS

John E. Curtis
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

Medium-range five-day forecasts from the U.S. Navy Operational Global Atmospheric Prediction System (NOGAPS) are investigated to study high and low predictability periods from two winter seasons. Northern hemisphere 500 mb height fields are scored using the anomaly correlation coefficient. An objective method is used to choose high and low scoring periods which are analyzed suing height tendencies and wavenumber structure. Results show that it is possible to objectively determine why some high and low periods occurred. Flow characteristics leading to high scoring five-day forecasts include: long wave amplitude decay, transition from meridional to zonal flow, and more meridionally extensive flow patterns. This study revealed that persistence is not a good indicator of model performance, and appreciable skill difference exists between good and poor five-day forecasts at the 48 hour point. However, no single measure of the flow patterns is found to be a unique indicator of high or low scoring forecasts.

Master of Science in
Meteorology and Oceanography
December 1985

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A STUDY TO DETERMINE THE RELATIVE SKILL OF FOUR MODEL OUTPUT STATISTICS PREDICTION METHODS USING SIMULATED DATA FIELDS

Steve J. Fatjo
Lieutenant, United States Navy
B.S., Old Dominion University, 1979

This report describes the testing of four Model Output Statistics Prediction methods on simulated data fields for the purpose of determining their relative skills in forecasting a generic weather parameter (predictand). Of the four methods, three use Bayes Law of Inverse Probability to discriminate, while the other method uses conditional probability. The simulated data sets, models and observers necessary to accomplish this goal are created according to a uniquely developed simulation design. The results indicate that there is a definite difference in the ability of one of the four methods, namely the method using conditional probability, to forecast the weather parameter. Through the use of the Analysis of Variance (ANOVA) technique, this difference is found to be significant with respect to chance.

Master of Science in
Meteorology and Oceanography
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CONTRIBUTION OF ATMOSPHERIC FORCING TO COOLING OF THE ARABIAN SEA DURING ONSET OF THE SOUTHWEST MONSOON

David W. Gillard
Lieutenant, United States Navy
B.S., Purdue University, 1978

The rapid cooling of the mixed layer in the Arabian Sea during the southwest monsoon onset is examined. The atmospheric forcing fields over the Arabian Sea during the onsets in 1979, 1984 and 1985 are analyzed. Realistic wind speed and evaporative heat flux increases occur soon after onset. The solar radiation flux analyses suggest that both the Navy Operational Global Atmospheric Prediction System and the National Aeronautics and Space Administration four-dimensional data assimilation models are too simplistic for accurate solar radiation flux calculations in the tropics. The solar radiation fluxes appear to be too low during the pre-onset periods and too high during the post-onset periods. The atmospheric forcing fields are then applied to a one-dimensional, ocean mixed layer model at four locations. The magnitude of the predicted sea-surface temperature decrease is 0.5 to 1.0°C during the 1984 and 1985 monsoon onsets. The results suggest that local atmospheric forcing accounts for most of the mixed layer cooling on a time scale of less than ten days and away from any major ocean current regions. The direct heat loss to the atmosphere contributes more to cooling of the mixed layer than does entrainment mixing at the base of the layer.

Master of Science in
Meteorology and Oceanography
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SAMPLING STRATEGIES IN SPACE AND TIME: EFFECTS ON REPRESENTATION OF MESOSCALE PROCESSES

John L. Heishman
Lieutenant, United States Navy
B.S., University of Alabama, 1978

This study examines along-track spacing increments from model output to determine the largest separation of data sampling permissible to achieve a reasonable representation of ocean mesoscale features without serious aliasing. With this objective, three sampling strategies are tested and analyzed by conducting simulated aircraft and shipboard cruises. Due to the limited number of observations acquired during each cruise, analyses of the data fields utilize an objective analysis technique which assesses the spatial correlation and RMS error by comparing the sampled data sets to the assumed perfect PE output fields. Of the schemes tested, the sampling strategy of using finer sampling along the coast and random sampling offshore with either aircraft or less than five-day hydrographic surveys results in the 'best' representation of mesoscale processes in a coastal region.

Master of Science in
Meteorology and Oceanography
September 1986

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ANALYZED POTENTIAL VORTICITY FIELDS FOR EXPLOSIVE AND NON-EXPLOSIVE CYCLOGENESIS EVENTS DURING FGGE

Peter J. Kirchhoffer
Lieutenant, United States Navy
B.S., University of Wisconsin, Madison, 1979

Potential vorticity and jet streak properties associated with 23 explosive and non-explosive cyclones from the western North Atlantic and western North Pacific Oceans are analyzed for the period 17 January to 23 February 1979. ECMWF analyses with FGGE data are used to represent the 300 mb wind fields over these ocean areas. Relative maxima in potential vorticity are present upstream of all cyclones. Storm tracks with respect to the potential vorticity are present upstream of all cyclones. Storm tracks with respect to the potential vorticity maxima are counter-clockwise with the greatest sea-level pressure decreases occurring when the storm is to the east or southeast of the maximum. Only five of the 23 cases have a pre-existing potential vorticity lobe that becomes superposed with the surface features and enhances cyclogenesis. In the remaining cases, the cyclone and potential vorticity lobe propagate and develop concurrently. The presence of a jet maxima over the storm is a major factor in storm development with large pressure falls being directly related to higher 300 mb wind speeds. In 20 of 23 cases, the storm is in the left-front jet quadrant at some time during its development. A statistical analysis demonstrates that forecasting the actual values of 12-h pressure falls from the potential vorticity and wind fields is difficult. However, forecasting development within one of three intensity categories using a discriminate analysis technique may approach 90% accuracy for explosive cyclones.

Master of Science in
Meteorology and Oceanography
September 1986

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COASTAL ERROSION ALONG MONTEREY BAY

Timothy McGhee
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

Coastal erosion, as inferred by measuring bluff recession is correlated with local wave height at twelve sites along the Monterey Bay coastline. Bluff recession rates are established by applying precise photogrammetric techniques to a 44-year time series of aerial photographs. Wave heights are determined from the U.S. Army Corps of Engineers Wave Information Studies spectral wave climatology, where deep water gravity waves are hindcast from historic wind fields at three-hour intervals from January 1956 to December 1975. The deep water spectra are refracted to shallow water spectra at a nominal depth of 4 m. An erosion model is developed for Monterey Bay where the erosion process is modelled as a non-linear function of th 4-m significant wave height:

$$R = [AHs^2 + BHs + C(Tide + 1.02Hs - Clifftoe)]/Beach\ Slope$$

The coefficients A, B, C are computed from a least squares regression of the modelled and observed recession rate values. The erosion model provides a reasonable representation of the erosion process in Monterey Bay, where the mean standard error between observed and modeled erosion rates is $\pm$1.17 m/yr. Adjustment of the wave energy coefficient, A, allows tuning of the model for high and low wave energy locations.

Master of Science in
Meteorology and Oceanography
September 1986

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CHANGES IN THE OCEAN MIXED LAYER FOLLOWING EXTRAORDINARY ATMOSPHERIC FORCING

Theodore R. Mettlach
Lieutenant, United States Navy
B.S., The Florida State University, 1979

A 1D ocean planetary boundary layer model is used to predict the evolution of the thermal structure of the ocean mixed layer at six locations in the ocean following the hypothetical effects on the atmosphere of a major nuclear war. The inputs to the ocean model are the heat and momentum fluxes computed from a 3D climate model designed to simulate "nuclear winter" effects in the atmosphere. The experiment gives evidence that the summertime mixed layer can cool 5°C within 30 days and that the effect of increased wind along coastal regions due to sudden ocean-land temperature differences will deepen the mixed layer 20 to 30 meters.

The scientific literature on the subject of "nuclear winter" is reviewed and interpreted to trace the evolution of the "nuclear winter" hypothesis and to assess the quality of the results of the mixed layer experiment.

Master of Science in
Meteorology and Oceanography
December 1985

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SYNOPTIC/MESOSCALE METEOROLOGICAL FEATURES IN THE MARGINAL ICE ZONE

Larry Dee Phegley
Lieutenant, United States Navy
B.S., University of Oklahoma, 1976

Meteorological conditions occurring in the Marginal Ice Zone Experiment (MIZEX-84), conducted in the East Greenland Sea during the summer of 1984, are summarized. This recapitulation includes a discussion of the synoptic and mesoscale conditions. The three cases discussed are: a weak storm which filled over the marginal ice zone (MIZ), an intense storm which transited the MIZ and entered the polar basin, and an undisturbed case.

The MIZEX-84 period can be divided into three synoptic time periods. The first and the last were situations when the storms passed to the south and east of the Fram Straits. During the middle period the storms passed through the straits in response to the development of a closed upper-level low over the north coast of Greenland.

Three of the four storms which moved into the straits were moving north-northwest and filled or slowed significantly in the MIZ. The fourth was moving parallel to the MIZ. This would seem to show that the MIZ does not dominate storm movement but may affect storm movement.

Master of Science in
Meteorology and Oceanography
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HEAT AND MOISTURE BUDGETS OF AN EXTRATROPICAL CYCLONE BASED ON NAVY OPERATIONAL REGIONAL ATMOSPHERIC PREDICTION SYSTEM (NORAPS) ANALYSES AND FORECASTS

Robert E. Rau, Jr.
Lieutenant, United States Navy
B.S., St. Louis University, 1977

Navy Operational Regional Atmospheric Prediction System (NORAPS) analyses and forecasts with 80 km resolution are used to investigate the rapid development of an extratropical cyclone during 28-29 March 1984 over the southeastern United States. The lateral transport of vorticity strongly contributes to the spin-up of the low-level vortex. Diabatic heating and moistening rates are estimated within 500 km of the storm from quasi-Lagrangian heat and moisture budgets and compared with the same rates internally predicted within the NORAPS model. The diagnosed maximum diabatic heating and moistening from analyses agree within 100 mb in elevation and 6 h in time with the model-predicted values. The model-predicted diabatic heating and moistening rates are 50% to 100% greater than diagnosed budget calculations due to an incorrect specification of the moistening and heating rates in NORAPS. Compared to more intense cases of explosive maritime cyclogenesis, the higher level and lower magnitude of maximum diabatic heating is consistent with the weaker deepening rate and continental nature of this storm.

Master of Science in
Meteorology and Oceanography
June 1986

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THE RELATIONSHIP BETWEEN MARINE AEROSOL OPTICAL DEPTH AND SATELLITE-SENSED SEA SURFACE TEMPERATURE

Susan K. Runco
Lieutenant, United States Navy
B.S., Florida Institute of Technology, 1976

Multichannel sea surface temperatures (MCSST) computed from NOAA-7 AVHRR channels 4 and 5 are compared to sea surface temperatures measured by an aircraft radiometer (PRT-5). This data set was collected in Fall, 1982 off the southern Californian coast. The MCSST was warmer by 0.82 degrees in the area where aerosol effects did not offset increasing radiance due to vertically warming air temperature. As aerosols were able to offset the temperature contribution to radiance, the difference between MCSST and PRT-5 SST measurements decreased.

Aerosol effects on infrared radiance were qualitatively examined using an atmospheric transmittance model (LOWTRAN 6). Comparing the model and PRT-5 results indicates that below the marine boundary layer, high aerosol extinction caused significant cooling. Above the boundary layer, aerosols scattered and emitted energy, generally decreasing the measured radiance. The emission moderated the decrease by increasing the radiance slightly.

Master of Science in
Meteorology and Oceanography
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VARIATION OF SURFACE FRICTION VELOCITY ACROSS THE MARGINAL ICE ZONE IN THE EAST GREENLAND SEA

Roberta Melvina Runge
Lieutenant, United States Navy
B.S., Montana State University, 1976

The Marginal Ice Zone Experiment (MIZEX) took place in the summer of 1984. All data presented in this thesis are from the 15 June - 15 July time frame of the MIZEX. Of primary concern in the marginal ice zone is the surface stress, which contributes to changing the upper part of the ocean, to ocean eddy formation and dissipation and to ice movement. This thesis investigates the surface layer wind, temperature and, in particular, the variation of the surface stress in the open water along the marginal ice zone. The stress values were obtained using the dissipation method. These values will be compared to the Large and Pond bulk-formulated drag coefficients, which are open water values. From this comparison, a realistic estimate of atmospheric forcing in the marginal ice zone can be obtained.

Master of Science in
Meteorology and Oceanography
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Meteorology

A DIAGNOSTIC INVESTIGATION OF EXPLOSIVE MARITIME CYCLOGENESIS DURING FGGE

Darrell H. Smith
Lieutenant Commander, United States Navy
B.S., University of Oklahoma, 1976

A collection of explosive and non-explosive storm groups are selected from the western North Atlantic Ocean and western North Pacific Ocean during the Period 17 January 1979 to 23 February 1979. Explosive cyclogenesis is defined as having a mean sea-level pressure fall of 1 mb h^{-1} for 24 h. Using ECMWF analyses with FGGE SOP-1 data, the storm-environment properties of both storm types are analyzed and compared. Storm environment properties include static stability, layer-averaged potential temperature, low-level vorticity, vorticity advection, mean and eddy modes of vorticity transport, divergence and kinematic vertical velocities. These properties are compared between the cyclone types at 0 h, 12 h and 24 h periods as well as the overall 24 h average. The largest differences between the explosive group and the non-explosive group are found in the upper-level divergence and vorticity advection. The explosive systems are warmer; however, static stabilities of the two groups are quite similar.

Master of Science in
Meteorology and Oceanography
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Meteorology

WIND-CURRENT RELATIONSHIPS IN THE OPTOMA DOMAIN OFF THE NORTHERN CALIFORNIA COAST

Steven J. Summers
Lieutenant Commander, United States Navy
B.S., University of Michigan, 1975

The oceanic response to time-dependent wind forcing approximately 100-200 km off the Northern California coast is examined through cross-spectrum analysis of current and wind time series. Current meter records 10 months in length from three moorings in deep water 100-200 km off the coast are analyzed in conjunction with surface wind analyses from the Fleet Numerical Oceanography Center (FNOC). Coherence is found between atmospheric and oceanic variables in the "locally forced" band (1-10 day period), in the "planetary wave" band (10-30 day period), and at low frequency (greater than 30 day period), though not in all of these bands for all records. The barotropic and first baroclinic dynamical modes appear to respond to wind forcing at different frequencies for two of the moorings analyzed. There is coherence between alongshore divergence and temperature fluctuations 100 km farther offshore, consistent with offshore advection by current filaments. Evidence of the Sverdrup balance is found for some periods greater than 18 days in the form of coherence between wind stress curl and the current component parallel to the local potential vorticity gradient. Complex bottom topography and the influence of coastal processes in the vicinity of the current meter moorings appear to greatly complicate the flow. There appears to be significant mesoscale variability in the region at scales too small to be resolved by the 100 km spacing of the OPTOMA moorings.

Master of Science in
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A LINEAR STABILITY ANALYSIS OF THE RAPID DEVELOPMENT OF AN EXTRATROPICAL CYCLONE

Raymond F. Toll, Jr.
Lieutenant, United States Navy
B.S., University of Utah, 1978

The phenomenon of the rapid growth and development of an extratropical cyclone over the east coast of the United States (the Carolinas storm of March 1984) is studied through a linear stability analysis. Analyses of the cyclone structure suggest barotropic and baroclinic instabilities may be important. A linear stability model is used to investigate the roles and relative importance of shortwave baroclinic instability and barotropic instability in the growth and development of the storm. The growth rates, phase speeds and structure obtained from the linear model are consistent with those derived from observations. Energy budget results indicate that the vertical and horizontal barotropic terms are at least as important as the baroclinic term. It appears that the early growth and development of the cyclone can be explained through the contributions of barotropic and baroclinic instabilities without including convection.

Master of Science in
Meteorology and Oceanography
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Advisors: J.C.L. Chan
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EFFECTS OF STORM-RELATED PARAMETERS ON THE ACCURACY OF THE NESTED TROPICAL CYCLONE MODEL

Brian J. Williams
Lieutenant, United States Navy
B.A., University of Washington, 1979

The performance of the Nested Tropical Cyclone Model (NTCM) for 542 forecasts in the western North Pacific during 1981-1983 is evaluated with respect to five storm-related parameters: intensity, 12-h change in intensity, latitude, longitude and size. This study is intended to aid the operational forecaster in deciding when to use the NTCM based on storm-related parameters at the forecast time. The storm-related parameters are divided into three subsamples (about 180 in each) and the forecasts are evaluated in terms of the mean forecast error, median forecast error and systematic (zonal and meridional) error. Cross-track (CT) and along-track (AT) components are computed relative to a CLImatology and PERsistence (CLIPER) track. A scoring system (M) that assesses penalty points for forecasts in incorrect terciles is used to compare the accuracy of the NTCM and CLIPER forecasts within the subsamples. For the entire sample, the NTCM has a slow bias, especially at the 12- through 36-h forecast periods. It also performs better for storms with initial latitudes south of 13° N and initial longitudes west of 129° E. For very large storms, the NTCM forecasts have both left-of-track and westward biases which indicate problems of the NTCM in predicting recurvature of such systems. The NTCM (which has a 60-kt bogus) forecasts for storms with initial intensities between 50 and 75 kt have much lower CT/AT M scores and smaller forecast errors than the subsamples with initial intensities less than 50 kt or greater than 75 kt.

Master of Science in
Meteorology and Oceanography
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TELECONNECTIONS AND SEA ICE VARIABILITY IN THE GREENLAND SEA

Ward A. Wilson, III
Lieutenant, United States Navy
B.S., High Point College, 1980

The hypothesis that the sea ice variability in the Greenland Sea is related to atmospheric teleconnections is tested. The teleconnections included in this test are the Southern Oscillation Index (SOI) and the North Atlantic Oscillation Index (NAO). Anomalous monthly time series for the sea ice extent, SOI, and the NAO are examined for the 25-year period of 1953-1977. The results show that the sea ice anomaly is negatively correlated with the SOI anomaly when the sea ice lags the SOI 24 to 29 months. Also, the sea ice anomaly is found to be negatively correlated with the NAO anomaly when the sea ice lags the NAO 0 to 2 months. Cross-correlations of the data sets by season failed to reveal any significant seasonal dependence.

Master of Science in
Meteorology and Oceanography
June 1986

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MASTER OF SCIENCE

IN

OCEANOGRAPHY

FISHERIES ASPECTS OF SEAMOUNTS AND TAYLOR COLUMNS

Russell E. Brainard
Lieutenant JG, NOAA Corps
B.S., Texas A&M University, 1981

Three hypotheses to explain the high biological productivity observed over the southern Emperor-northern Hawaiian Ridge seamounts are suggested: larval retention by hydrodynamic trapping in a Taylor column, nutrient enrichment by topographically-induced upwelling, and attraction of organisms to stationary physical substrates. Quasi-geostrophic wave-topography interactions are considered, with particular regard to Taylor column dynamics. Data from three hydrographic surveys over Southeast Hancock Seamount conducted during summer 1984 and winter 1985 are examined for evidence supporting these hypotheses. The two summer surveys show features consistent with a two-layer system having bottom-intensified anticyclonic flow around the seamount, in agreement with stratified Taylor column theory. The winter survey indicates more homogeneous anticyclonic flow around the seamount, suggesting the existence of a barotropic Taylor column. Possibly intense internal wave motion and upwelling are suggested by strong, localized vertical isotherm deflections in across-seamount sections taken during the summer surveys. These deflections are reminiscent of wave-topography interactions in atmospheric flow over terrestrial mountains. The second summer survey showed possible upwelling in the lee of topographically-forced divergence.

Master of Science in
Oceanography
September 1986

Advisors: R.W. Garwood
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SEDIMENT BUDGET FOR MONTEREY BAY

E.N. Oradiwe
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B.A., University of Ibadan, 1973

A sediment budget analysis based on the principle of mass conservation is performed for Monterey Bay. The various littoral processes in the Bay are evaluated quantitatively. The results indicate that about 2.1×10^6 cubic yards of sand are deposited annually into the Bay, which is treated as a quasi-closed system.

Deposition from cliff erosion, computed from the cliffs profile changes, amounted to 5.6×10^5 cubic yards, and accounted for 27% of the total deposit. River discharges were extrapolated using a power law formula; the total yield was 11.4×10^5 cubic yards, representing 54% of the entire sediment deposition. The potential longshore drift was evaluated using an 18 years spectral wave climatology; its contribution was 4.09×10^5 cubic yards which amounted to 19%. Sediment losses accrued from submarine canyon deposition, sand mining operations, offshore deposition by rip currents and eolian sediment transport to the dunes; these losses amounted to 23.4×10^5 cubic yards and were all estimates taken from previous studies.

The budget deficit signifies an erosion trend along the Bay. The effects of sand mining to coastal erosion are discussed. Recommendations needed to refine the budget analysis and to establish a correlation between the budget deficit and shoreline erosion are presented for further research.

Master of Science in
Oceanography
March 1986

Advisor: E.B. Thornton
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MASTER OF SCIENCE

IN

OPERATIONS RESEARCH

A SEARCH FOR FACTORS CAUSING TRAINING COSTS TO RISE BY EXAMINING THE U.S. NAVY'S AT, AW, AND AX RATINGS DURING THEIR FIRST ENLISTMENT PERIOD

Eugene Kapua Aiu
Lieutenant, United States Navy
B.S., Marquette University, 1979

Training costs have increased in the U.S. Navy. This study examines accession data to determine if the following events caused training costs to rise: length of basic training, attrition, and amount of specialized training. The examination of these issues is restricted to three enlisted ratings: AT, AW, and AX. The time frame encompasses year groups 77 through 84. On the basis of this limited study, there is no reason to associate these three variables with increased costs.

Master of Science in
Operations Research
September 1986

Advisor: D.C. Boger
Department of
Administrative Sciences

AN ANALYTICAL HIGH VALUE TARGET ACQUISITION MODEL

Kevin J. Becker
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

An analytical High Value Target (HVT) acquisition model is developed for a generic anti-ship cruise missile system. The target set is represented as a single HVT within a field of escorts. The HVT's location is described by a bivariate normal probability distribution. The escorts are represented by a spatially homogeneous Poisson random field surrounding the HVT. Model output consists of the probability that at least one missile of a salvo acquires the HVT, conditioned on the number of missiles in the salvo which penetrate the HVT area defense. In addition, the fall of multiple penetrators is modeled using a conditional multinomial probability distribution. The model's equations are used to solve for an optimal missile seeker range gate, given a probability distribution describing the location of the HVT within the targeted formation at the time the missile commences its search. Included in an appendix is a time-dependent model describing HVT location which provides for HVT movement during missile time of flight up to the moment of active search.

Master of Science in
Operations Research
March 1986

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A DYNAMIC MODEL FOR AIRFRAME COST ESTIMATION

Ronald Lee Brown
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B.A., The Johns Hopkins University, 1977

The Department of Defense has historically favored a relatively simple parametric approach to cost estimation. Economic theory has largely been ignored and the learning curve has become the customary analytical tool for relating production quantities to airframe costs. This research examines an effort to synthesize neoclassical economic theory with the traditional learning curve methodology. The proposed model implements a dynamic cost function that considers the effects of learning and production rate on the production process. To empirically test its validity, the model is applied to the F-4 Phantom II production program and parameters are estimated using historical production data.

Master of Science in
Operations Research
March 1986

Advisor: D.C. Boger
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Administrative Sciences

USE OF THE RADIO SHACK TRS-80 MODEL 100 COMPUTER FOR COMBAT MODELING

Steven H. Cary
Captain, United States Army
B.S., Kansas State University, 1974

The primary purpose of this thesis is to demonstrate some principles of combat modeling using programs for the Radio Shack TRS-80 Model 100 computer. In addition to the combat modeling, the thesis includes several utility programs for the M100 of interest to students of operations analysis.

The combat modeling programs include an antisubmarine warfare (ASW) detection simulation, a Kalman filter, and a Lanchester differential equation simulation. The utility programs include a matrix algebra program, a numerical double integration program using Simpson's Rule and the Romberg integration algorithm, and a geometric programming program for zero degree of difficulty problems. The integration program is also written as a subroutine that can be included in other programs. The matrix algebra program includes a simultaneous linear equation solving subroutine which can be used in other programs.

All programs are written in M100 BASIC. Documentation includes an explanation of the input required, the output produced, and the components of each program, and sample problems. The chapter on geometric programming includes a tutorial on the mathematical basis for that technique.

Master of Science in
Operations Research
September 1986

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Operations Research

AN ANALYSIS OF THE BOOTSTRAP METHOD FOR ESTIMATING THE MEAN SQUARED ERROR OF STATISTICAL ESTIMATORS

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B.S., University of Andorra, 1972
M.S., University of Navarra, Spain, 1975

One of the most crucial problems in theoretical and applied statistics is to determine the precision of the estimates produced by different statistical estimators. This problem is greatly increased when the population parametric characteristics are not known. Parallel to this problem is that of deciding how large (or small) the sample population must be in order to obtain a desired precision within certain range.

There are several non-parametric methods to approach the first problem. The BOOTSTRAP Method (Efron, 1979) is one of these approaches and the one of interest in this thesis. With this method, one could improve the precision of the estimates and gain information about the distributional characteristics of statistical estimators. The bootstrap method has been amply compared with other methods; the results show that the bootstrap method often produced more precise estimates (i.e., with smaller mean squared error) than competitors such as the JACKNIFE, SECTIONING and CROSS-VALIDATION. However, the results that have been obtained are based on large sample sizes and large numbers of "bootstrap" replications.

This thesis analyzes the behavior of the BOOTSTRAP method when the number of bootstrap replications is small. It tries to identify any tradeoffs between sample size and the number of bootstrap replications required to attain a desired precision in the estimates produced in several particular situations. One of the goals is to produce graphical displays that will indicate to the experimental statistician the price

that must be paid in the precision of the estimates, obtained with the bootstrap method, when sample size is small, and the number of bootstrap replications to use in this situation.

Master of Science in
Operations Research
September 1986

Advisors: D.R. Barr
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Operations Research

DETERMINATION OF SELECTIVE REENLISTMENT BONUS MULTIPLIERS IN THE UNITED STATES MARINE CORPS

Dean D. DeWolfe
Captain, United States Marine Corps
B.S., University of Virginia, 1980

Selective Reenlistment Bonuses (SRBs) are offered to improve retention in designated military occupational specialties (MOSs) for specified years-of-service intervals (zones). The amount of the bonus is set by assigning an "SRB Multiplier" for each MOS and zone combination (cell).

Determination of multipliers is modeled as a nonlinear knapsack problem which is then linearized to a generalized assignment problem. The objective is to minimize the sum over all cells of a weighted squared deviation from the reenlistment target in each cell. Lagrangian relaxation provides lower bounds and feasible solutions. The best feasible solution is improved using a greedy heuristic to apportion unexpended funds.

A FORTRAN 77 computer program implements the procedure. Data for FY86 yields a 0-1 integer program with 4895 binary variables and 980 constraints. A solution within .01% of optimality is obtained on an IBM 3033AP in 1.7 seconds and on an IBM PC in about four minutes.

Master of Science in
Operations Research
March 1986

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COMPARISON OF TIME TO DETECT DEFINITIONS

Laurence M. DuBois
Captain, United States Army
B.S., California Polytechnic State University, 1976

This thesis concerns the measurement of times to detect multiple targets. It compares two common definitions of times to detection--interdetection time, and search time to detection--to a relatively new definition called time in field-of-view until detection. This comparison uses the data from the Thermal Pinpoint Test conducted from July to December 1983. Detection time distributions and mean times to detection were studied, looking for patterns in the geometric ordering of targets, and in the chronological ordering of detections. Observer search scan behavior was also briefly analyzed. Mean time in field of view displayed some interesting results. Significant correlation was discovered between the mean time to detect one target and the mean time to detect the next target. Additionally, a linear trend was found in the mean time in field-of-view over chronologically ordered detections. Finally, a mathematical model was derived to explain the time to detect a sequence of targets.

Master of Science in
Operations Research
June 1986

Advisor: D.R. Barr
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Operations Research

A MODEL FOR AND METHOD OF PREDICTING HIGH QUALITY ARMY ENLISTMENT CONTRACTS

Jack C. Faires
Captain, United States Army
B.S., United States Military Academy, 1978

There are many variables that contribute to the explanation of why a person enlists in the army. To efficiently manage personnel policy in regards to the recruitment process, the impact and significance of these variables needs to be fully understood. Ordinary least squares regression analysis is a powerful and useful tool in helping to explain the interaction of these variables. The understanding of the theories and methods behind this approach is essential. Army analysts apply regression derived results every day in a myriad of situations and operational contexts. Misuse or misunderstanding of these results can lead to inaccurate recommendations to the decision-maker.

The thesis develops the framework for a parsimonious linear statistical model of quality enlistment contracts for the U.S. Army. There is a need for such a model that can be utilized by USAREC and DCSPER analysts to perform quick response analysis to "what if" questions.

In order to facilitate further model enhancement and use, it is developed in a step-by-step fashion. The author uses a "walk through" approach and thoroughly discusses the assumptions, procedures and analytical tools that were utilized in the model development. This approach was specifically requested by the Army analysts at USAREC.

Master of Science in
Operations Research
September 1986

Advisor: D.C. Boger
Department of
Operations Research

MODELS FOR AVENUE OF APPROACH GENERATION AND PLANNING PROCESS FOR GROUND COMBAT FORCES

Douglas L. Fletcher
Captain, United States Army
B.A., University of Northern Colorado, 1975

This thesis extends the development of the Airland Research Model (ALARM), an on-going research effort at the Naval Postgraduate School, in the areas of generating tactical boundaries through avenue of approach generation and the development of a plan over time for the commitment of ground combat forces. Terrain analysis on the basis of flow rate is used to develop zones of action on a network. Through these zones of action, avenues of approach are determined to represent the movement of regimental size units. Development of a defensive plan for ground combat forces is based on the generalized value system (GVS), which is an integral part of ALARM. The plan produced is a series of missions over a planning time horizon for the units of a brigade in the defense, planning to fight a motorized rifle division.

Master of Science in
Operations Research
September 1986

Advisor: S.H. Parry
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TESTS FOR FOURTH ORDER AUTOREGRESSIVE PROCESSES

Robert L. Foster, Jr.
Lieutenant, United States Navy
B.E., Vanderbilt University, 1979

Upper and lower bounds were determined for a variation of Schmidt's statistic using Imhoff's distribution for quadratic forms in normal variables. This statistic is able to detect a fourth order autoregressive disturbance of the form $\varepsilon_t = \rho_1\varepsilon_{t-1} + \rho_4\varepsilon_{t-4} + \eta_t$ in the general linear model $Y = X\beta + \varepsilon$.

To correct for this disturbance and thus yield efficient regression estimates, a data transformation was derived using the inverse of the variance-covariance matrix as defined by Siddiqui.

Master of Science in
Operations Research
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Advisor: D.C. Boger
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Administrative Sciences

A SIMULATION STUDY OF ESTIMATES OF A FIRST PASSAGE TIME DISTRIBUTION FOR A CENSORED SEMI-MARKOV PROCESS

Rick M. Gallagher
Lieutenant, United States Navy
B.S., University of Minnesota, 1979

This thesis reports on a simulation study of parametric and nonparametric estimators of a first passage time distribution for a censored semi-Markov process. Four estimators are proposed and compared; Maximum Likelihood Estimator, Renewal Equation Estimator, Asymptotic Renewal Estimator, and the Kaplan-Meier Estimator; the last three estimators are nonparametric. For the particular semi-Markov process studied, the Kaplan-Meier estimator of the first passage time appears to be the best for small times and the Asymptotic Renewal estimator appears to be the best for large times. The Maximum Likelihood estimator is sensitive to incorrect model assumptions. All the estimators are sensitive to censoring.

Master of Science in
Operations Research
September 1986

Advisor: P.A. Jacobs
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Operations Research

AN ALGORITHM FOR ALLOCATING ARTILLERY SUPPORT IN THE AIRLAND RESEARCH MODEL

John M. Geddes, Jr.
Captain, United States Army
B.S., United States Military Academy, 1976

This thesis extends the development of algorithms for modeling planning processes in the Airland Research Model (ALARM), an on-going research effort at the Naval Postgraduate School. An algorithm is developed to determine optimal mission assignments for supporting combat resources based on the determination of optimal firer-target combinations. The method of differential games is adopted as the optimizer for the algorithm. The algorithm is applied to a problem of determining artillery battalion mission assignments in supporting a U.S. brigade engaged with an energy division. The algorithm is solved using FORTRAN 77 and the IMSL routine DGEAR.

Master of Science in
Operations Research
September 1986

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Operations Research

GRAPHIC SIMULATION OF A JACKSON NETWORK

Gary F. Greene
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1977
M.B.A., University of Puget Sound, 1983

This paper presents the development of a graphic computer simulation of a Jackson network. In particular, the simulated network is a queueing system consisting of two servers in tandem, one customer entrance point, two potential customer exit points, and one potential customer feedback path.

This system is modeled as a discrete-event simulation implemented on an IBM Personal Computer (IBM PC). The IBM PC requires a color monitor, a color/graphics adapter card, at least one disk drive, and a minimum of 128 kilo-bytes of random access memory (RAM).

Master of Science in
Operations Research
September 1986

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Operations Research

A MULTIPLE LINEAR REGRESSION MODEL FOR PREDICTING ZONE A RETENTION BY MILITARY OCCUPATIONAL SPECIALTY

Ronald P. Higham
Captain, United States Army
B.S., United States Military Academy, 1978

The Selective Reenlistment Bonus (SRB) program is designed to offer an attractive reenlistment incentive to improve manning in critical skills. To efficiently manage the SRB program, a requirement exists to maintain MOS level estimating factors for use in projecting retention rate improvement as a function of SRB award level. This thesis formulates and solves a mathematical model which explains the variation in zone A retention rates as a function of SRB award level and other factors believed significant in the reenlistment decision.

To allow for comparison of the estimating factors associated with the SRB variable across MOS, an overall projection model was developed. Stepwise multiple linear regression analysis techniques were used on a subset of the enlisted MOS inventory in the model development phase of this analysis. The proposed overall model was then fitted to a second subset of MOS to validate the assumptions and effectiveness of the proposed linear model.

Master of Science in
Operations Research
September 1986

Advisors: J.B. Gafford
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Operations Research

THE USE OF EXPONENTIAL SMOOTHING TO PRODUCE YEARLY UPDATES OF LOSS RATE ESTIMATES IN MARINE CORPS MANPOWER MODELS

Daniel L. Hogan, Jr.
Lieutenant, United States Army
B.S., United States Military Academy, 1984

The use of exponential smoothing to perform yearly updating of attrition rates is examined and has merit. It shows enormous flexibility in adjusting to changes in the environment affecting the attrition rates, and it displays almost as much accuracy as the method it is intended to replac while using thousands of times less data.

A secondary purpose of this study is fulfilled in confirming that the current aggregate methods are outperformed by maximum likelihood estimation, transform cell scale average, James-Stein, and limited translation James-Stein. None of these four methods is dominant overall, but all are improvements over the estimation system now employed.

Master of Science in
Operations Research
June 1986

Advisor: R.R. Read
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A COMPARISON OF FOUR ESTIMATORS OF A FIRST ORDER AUTOREGRESSIVE PROCESS

Joseph A. Horn, Jr.
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B.S.M.E., United States Naval Academy, 1980

Econometricians must choose between many methods for estimating ρ, the autocorrelation coefficient, in a first order autoregressive process. This thesis examines the performance of four estimators in a Monte Carlo simulation. The methods examined are Durbin-Watson, Beach-MacKinnon, Theil-Nagar and Prais-Winsten. The autocorrelation coefficient, ρ, was varied from .2 to .9 and each method provided estimates of ρ and β, the regression coefficient, for 1000 replications. The results presented here are similar to those found in previous comparisons. Specifically, Ordinary Least Squares was found to be an efficient estimator of β when autocorrelation is present only to a slight degree. Of the four estimators examined, the performance of Theil-Nagar proved superior in estimating both ρ and β for small values of the correletion coefficient. Beach-MacKinnon, on the other hand, while containing a large bias in the estimation of ρ, is the more efficient estimator of β for large values of ρ.

Master of Science in
Operations Research
September 1986

Advisor: D.C. Boger
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Operations Research

BOXPLOTTED TABLES AND OTHER GRAPHICAL TECHNIQUES FOR EXPLORATORY DATA ANALYSIS

Juan M. Isusi
Major, Peruvian Air Force
B.S., Air Force Academy (Peru), 1973

This thesis presents several interactive computer programs for the analysis of multivariate data. A special case is that of panel data; multiple time series of short length. The first program, BOXPLOTAB, handles this type of multivariate data; it is an enhancement on an existing graphical technique for exploratory data analysis known as BOXPLOTS. The program works by appending boxplots as column dividers in a table of the raw data which originates the box plots. This combination of the raw data and the graphical representation of that data improves the understanding of the characteristics of the data in exploratory and descriptive applications; differencing and tracing of data through the table is also implemented. This thesis also presents and explores the use of other graphical techniques for exploratory data analysis of multivariate data such as STAR plots, PROFILE plots, CODED SCATTER plots and CODED DRAFTSMAN plots. These techniques are examined and implemented in a series of computer programs which produces these graphical displays. A technical description of each computer program is presented and user implementation procedures are discussed. The programs are implemented in APL and run in conjunction with the experimental IBM APL Graphics program GRAFSTAT. To demonstrate the use of these techniques, an analysis is conducted on several sets of multivariate data.

Master of Science in
Operations Research
September 1986

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AN EMPIRICAL STUDY OF A REFORMULATION OF THE CUMULATIVE AVERAGE LEARNING CURVE

David George Jenkins
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

One aspect of efficient management of resources that cannot be overstated is accurate cost estimation. The learning curve technique used in cost estimation continues to be a significant tool by itself and as an important factor in other cost estimation algorithms. This study conducts an empirical investigation of a theoretical reformulation of the cumulative average learning curve. The model is empirically corroborated by comparison of linear and nonlinear regression results with the classical unit and cumulative average learning curve specifications using two sets of aircraft production data. When autocorrelation was present and subsequently modeled into the data, the resulting linear models were significantly distorted whereas the non-linear models were not. While the model being scrutinized was adequate, the unit learning curve appeared to be the superior model.

Master of Science in
Operations Research
March 1986

Advisor: D.C. Boger
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Administrative Sciences

REGRESSION MODELS OF QUARTERLY OVERHEAD COSTS FOR SIX GOVERNMENT AEROSPACE CONTRACTORS

David J. Jerabek
Lieutenant, United States Navy
B.A., United States Naval Academy, 1979

Since overhead costs constitute a large percentage of total cost for aerospace contractors, it is important to be able to predict them accurately. The research performed in this thesis takes six government aerospace contractors and obtains regression models of their overhead costs that can be utilized for forecasting purposes. This method is preferable to some of the more commonly used methods because it estimates overhead costs directly, eliminating reliance upon predicted overhead rates. After the data were transformed to eliminate the effects of autocorrelation, excellent structural results were obtained for five of the six aerospace contractors. A Monte Carlo simulation was performed to compare various estimators of the autocorrelation. Two of the estimators were found to be superior. These two estimators are both two-stage estimators that are calculated utilizing Wallis's test statistic for fourth-order autocorrelation.

Master of Science in
Operations Research
March 1986

Advisor: D.C. Boger
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THE INTERNAL STATES OF THE 3-COMPONENT STANDBY SYSTEM

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Fachhochschule des Heeres, Darmstadt, 1977

The study analyzes the internal states of a 3-component system with one active element and two spares in cold standby (pure replacement policy without repair). Elements of the system are assumed to have exponentially distributed lifetimes, however, special attention is paid to systems composed of components with different failure rates. The analysis is developed as a continuous-time Markovian process with stationary transition probabilities. Probabilities that exactly i components have failed by time t are calculated based on three levels of information: for systems in unknown condition, for systems known to be in UP-condition, and for systems whose condition was not observed for some amount of time. A key part is the investigation of conditional probabilities of i components having failed by time t for a system known to be UP, the conditional limiting distribution as $t \to \infty$, and relation to the system failure rate. State probabilities for systems not monitored continuously for being UP are shown to be bounded between those corresponding to systems that are either observed constantly or not at all.

Master of Science in
Operations Research
September 1986

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Operations Research

THE GENERALIZED VALUE SYSTEM AND FUTURE STATE DECISION-MAKING

Robert Allen Kilmer
Captain, United States Army
B.S., Indiana University of Pennsylvania, 1976

This thesis addresses the problem of modeling the decision processes in the Airland Research Model. The Generalized Value System (GVS) is presented as a tool for evaluating the power and value of entities throughout the battlefield at present and future times. Precise definitions and procedures for determining various aspects of power and value are presented. The GVS provides the basis for an approach called future state decision-making. An example is given which shows how the approach is used to make decisions at the present time based on what the situation is expected to be in the future.

Master of Science in
Operations Research
March 1986

Advisor: S.H. Parry
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Operations Research

AN EVALUATION OF POTENTIAL COUNTERMEASURES TO THE STRATEGIC DEFENSE INITIATIVE

Duane M. Lafont
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

The key uncertainty within the Strategic Defense Initiative is not whether a multitiered ballistic missile defense can be designed and implemented, but rather in the possibility that the intercept system can be readily countered. Additionally, the viability of SDI is dependent upon its cost effectiveness; a defense should not be considered if it can be overcome at a significantly lesser cost.

To quantify these uncertainties, the Strategic Defense Initiative is overviewed at a macro level. Potential countermeasures to proposed defensive technologies are defined and analyzed as to their feasibility and the possible leverage, both in cost and in further uncertainty, that the use of the countermeasure would provide. The study also addresses possible counter-countermeasures, where applicable. The results of the study can be used to provide input parameters to systems simulations and system analyses of SDI architectures and as an indicator of further study areas.

Master of Science in
Operations Research
March 1986

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Mathematics

EFFECTS OF SIMULATED SHIP MOTION ON THE PERFORMANCE OF UNDERWAY OFFICER OF THE DECK

Lesa A. McComas
Lieutenant, United States Navy
B.A., Franklin & Marshall College, 1978

The objectives of this study are twofold: to identify those cognitive skills required by the shipboard officer of the deck (OOD), and to determine if these skills are affected by simulated ship motion. The Position Analysis Questionnaire (PAQ) was used to analyze the duties of the OOD, and the important areas so identified were tested using the Automated Portable Test System (APTS) and a ship motion simulator. Analysis of the results revealed statistically significant effects on OOD performance due to motion in the areas of visual search and reasoning. In addition, there is some graphical indication that either higher or lower error rates are associated with motion, depending on the nature of the task.

Master of Science in
Operations Research
March 1986

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Operations Research

TRANSMITTER IDENTIFICATION WITH A SMALL NUMBER OF INDEPENDENT OBSERVERS

Andrew G. Meldrum
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B.S., University of Wisconsin, 1979

This thesis presents and compares algorithms that identify a signal (one or two parameters) from a known group. This identification is done with a small number of observers. Using simulation the algorithms are compared for robustness and accuracy. Robustness is simulated by drawing observations from a Cauchy and also from a mixed normal with two different mixing probabilities. The results of the simulations demonstrate that the maximum likelihood estimators based on the Cauchy or the mixed normal are satisfactory for both robust and nonrobust (outlier-prone) situations, while classical linear methods perform poorly if outliers are present.

Master of Science in
Operations Research
September 1986

Advisor: D.P. Gaver
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Operations Research

BATTLEFIELD MAINTENANCE AND RECOVERY MODULE FOR THE AIRLAND RESEARCH MODEL

Arild W. Olsen
Captain, United States Army
B.S., United States Military Academy, 1978

This thesis describes a battlefield maintenance and recovery model which will be used in conjunction with the Airland Research Model being developed at the Naval Postgraduate School. It was developed focusing on the two main levels of maintenance in an Army division. These are the organizational level and the direct support level. Its main area of emphasis is to determine the impact maintenance and recovery have on the combat value of a unit. It investigates the difference in two maintenance concepts. The first one being recover and return to the rear area for repair and the second being fix forward.

Master of Science in
Operations Research
March 1986

Advisor: S.H. Parry
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Operations Research

MODELING AIRCRAFT ATTRITION IN THE AIR DEFENSE ENVIRONMENT

George D. Panagakos
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B.S., Greek Air Academy, 1974

This thesis presents a high esolution, computer simulation model of aircraft attrition in the air defense environment. The model employs extensive pre-processing submodels and programs in order to efficiently examine tactical scenarios and reduce program execution time. The pre-processing outputs are loaded into a dynamic simulation submodel to analyze the aircraft/air defense engagement sequence. The overall simulation model is modular and can be easily modified to satisfy the user's particular analysis objectives.

Master of Science in
Operations Research
March 1986

Advisor: J.B. Gafford
Department of
Operations Research

PARAMETRIC AND NONPARAMETRIC ESTIMATION OF THE MEAN NUMBER OF CUSTOMERS IN SERVICE FOR AN M/G/00 QUEUE

Dong Keun Park
Lieutenant, Republic of Korea Navy
B.S., R.O.K Naval Academy, 1979
B.S., Korea University, 1983

This thesis studies the estimation from interarrival and service time data of the mean number of customers in service at time t for an M/G/00 queue. Two situations are considered. In one, the parametric form of the service time distribution is known. In the special case in which the service time distribution is exponential, the approximate bias and variance of the estimate derived and simulation is used to study an approximate normal confidence interval procedure. Simulation is also used to illustrate that assuming a wrong parametric model can lead to misleading results. In the other situation, the parametric form of the service time distribution is unknown and the empirical distribution of the service times is used in the estimate of the mean number of customers in service. In the case in which the customer arrival rate is known, the distribution of the estimate is derived and an approximate normal confidence interval procedure is suggested. The use of the bootstrap and jackknife procedure to estimate variability and construct confidence intervals for the estimate is also studied both analytically and by simulation.

Master of Science in
Operations Research
March 1986

Advisor: P.A. Jacobs
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A MENU DRIVEN SOFTWARE PACKAGE ON NONPARAMETRIC STATISTICS FOR THE TANDY RADIO SHACK MODEL 100 COMPUTER

Susan L. Quensel
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B.A., Illinois State University, 1968
M.A., Illinois State University, 1974

This thesis contains a software package and user documentation for use in solving nonparametric statistics problems. The following 11 tests are considered: Binomial test, Sign test, Cox-Stuart test, Quantile test, Quantile Confidence Intervals, McNemar test ($N \geq 20$). Tolerance Limits, Cochran test, Chi Square test, Median Test, and Chi Square Goodness of fit tests. The programs are in BASIC and are designed specifically for use on the Tandy Radio Shack M100 microcomputer.

Master of Science in
Operations Research
September 1986

Advisors: D.R. Barr
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LIMITED TRANSLATION SHRINKAGE ESTIMATION OF LOSS RATES IN MARINE CORPS MANPOWER MODELS

John R. Robinson
Major, United States Marine Corps
B.S., United States Military Academy, 1971

The use of shrinkage type estimators for the attrition rates in manpower flow models is extended to include the limited translation James-Stein technique introduced by Efron and Morris. The performance of these estimators is compared with that of several "natural" estimators on two scales: the original scale of rates, and the Freeman-Tukey transformation scale which was chosen in order to give shrinkage estimators more efficacy.

Generally, the aggregate methods currently in use are outperformed by MLE, transformed scale cell average, James-Stein, and limited translation James-Stein. The results among the four were mixed when both global and small inventory cell figures of merit were compared. It is felt that better data aggregation will permit limited translation to excel in low inventory estimation.

Master of Science in
Operations Research
March 1986

Advisor: R.R. Read
Department of
Operations Research

A PRELIMINARY DEVELOPMENT OF A NUCLEAR PROPULSION OFFICER ENLISTMENT SUPPLY MODEL

Paul T. Serfass, Jr.
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1974

This study constructs linear forecasting models, for each of the six Navy Recruiting Areas and the Recruiting Command, that attempt to predict future United States Navy Nuclear Propulsion Officer contracts signed in any one of four fiscal year quarters, given estimates of independent supply variables included in the models. The models are developed using stepwise multiple regression analysis with ordinary least squares and are supported by historical data from fiscal years 1981 through 1985. In developing the models, this thesis examines the relationship between the contracts signed in a given quarter and the following supply variables: number of recruiters, annual goals of number of contracts to be signed, military-to-civilian pay ratio, unemployment rate, size of target population (in the form of market share), advertising and marketing costs and seasonal effects, represented by proxy variables. The assumptions of using multiple regression analysis and linear models are examined through a graphical study of the residuals and do not seem to be refuted. Each of the models are corrected for first order autocorrelation. Validation of the forecasting models was attempted by the comparison of predicted contracts signed in a quarter against new contract data obtained for fiscal year 1986. The results of the forecasting comparisons are much worse than expected. Possible causes for the large error percentages in the comparisons are mentioned in this study but not examined in detail.

Master of Science in
Operations Research
September 1986

Advisors: P.R. Milch
G.W. Thomas
Department of
Operations Research

FOUNDATIONS OF THE INTELLIGENCE MODULE OF THE AIRLAND RESEARCH MODEL (ALARM)

Gaylon L. Smith
Major, United States Army
B.A., Saint Louis University, 1972

This thesis lays the foundation for the Intelligence Module of the AIRLAND RESEARCH MODEL (ALARM). It examines the relationship between the Intelligence Module and other modules of ALARM. Specifically, it develops the structure of the Intelligence Module to include the flow of combat information from other modules, the fusion of combat information into tactical intelligence, and the subsequent dissemination of that intelligence. Additionally, it proposes a Lanchester-type formulation for target acquisition and presents a methodology to estimate the required coefficients from the output of a high resolution combat simulation.

Master of Science in
Operations Research
September 1986

Advisor: S. Parry
Department of
Operations Research

APPLICATION OF LIFE DISTRIBUTIONS TO ESTIMATE EQUIPMENT LOSSES IN COMBAT

Hee Sun, Song
Major, Republic of Korea Army
B.S., Korea Military Academy, 1975

Combat active replacement factors, or CARFs, are logistics planning factors currently used by the U.S. military as estimates of equipment losses in future conflicts. This thesis employs mean-time-to-loss (MTTL) estimates for various equipment types, and several scenario-oriented models are given for mapping these values into CARFs. The CARF generation model can be applied for the exponential distribution or other types of life distributions such as Weibull or gamma, or a nonhomogeneous Poisson process. CARF values for several kinds of scenarios for combat losses were investigated using the loss processes for a specific life distribution. Computational results are provided.

Master of Science in
Operations Research
December 1985

Advisor: G.F. Lindsay
Department of
Operations Research

AN APPLICATION OF MULTIDIMENSIONAL SCALING TO DESCRIBE STRESS AMONG NAVAL HELICOPTER PILOTS

Thomas L. Walston, III
Lieutenant, United States Navy
B.S., United States Naval Academy, 1978

The technique of multidimensional scaling is used in an attempt to determine any patterns utilized by Naval helicopter pilots when grouping a given set of stressors. Both grouping data and ranking data were collected and analyzed from a survey among pilots. Information gained through the ranking data consists of perceptions of the helicopter pilots on how the stressors affect certain performance aspects. Numerical output, as well as graphical plots, were generated to reflect these perceptions.

Master of Science in
Operations Research
March 1986

Advisor: D.E. Neil
Department of
Operations Research

SURFSKED: AN OPTIMIZATION AID FOR SURFACE COMBATANT INTER-DEPLOYMENT SCHEDULING

Vern F. Wing
Lieutenant Commander, United States Navy
B.S., University of Washington, 1974

The surface force inter-deployment scheduling process is the means by which units of the U.S. Navy are slated to accomplish maintenance, training, and inspection events in preparation for planned deployments or emergent missions. The schedule objective is to maximize fleet readiness while meeting the constraints of fuel, budget, home port time, and availability of supporting services.

This study provides a computerized model (SURFSKED) to assist schedulers in the optimization of the inter-deployment schedule. A set-partitioning model is used in a two-stage heuristic process to minimize scheduling costs subject to constraints on support assets.

The model is tested using a combination of actual and hypothetical data for 96 ships of the Pacific Fleet. The test runs include 88 event types and generate 13 week (one quarter) schedules.

Master of Science in
Operations Research
September 1986

Advisor: R.K. Wood
Department of
Operations Research

ECONOMIC ANALYSIS OF VEHICLE SHARING MODE FOR JOURNEY TO WORK BY INDONESIAN OFFICE EMPLOYEES

Sulistiono Wreksodihardjo
Major, Indonesian Navy
B.S., Indonesian Naval Academy, 1970
Mech. Eng., Indonesian Naval Institute of Technology, 1979

This thesis analyzes the economics of vehicle sharing and the implementation of this mode of transportation for major Indonesian cities. Current vehicle sharing programs are reviewed, and a model is constructed which parameterizes the major elements of the vehicle sharing decision. The model is validated using historical data. Then the model is used to assess the feasibility of vehicle sharing programs for five areas of Indonesia. The model indicates that such programs are feasible for these areas, and the thesis concludes by examining some important elements in implementing such programs.

Master of Science in
Operations Research
June 1986

Advisor: D.C. Boger
Department of
Administrative Sciences

OPTIMIZATION OF OPTIMAL PING STRATEGY FOR RANDOM ACTIVE SONAR SEARCH IN A COUNTERDETECTION ENVIRONMENT

Walter J. Wright
Lieutenant, United States Navy
B.S., Auburn University, 1980

This thesis is an analysis of the one-on-one ASW search problem using a random active search strategy in an environment that favors the target's counterdetection ability. The objective is to determine an optimum ping strategy by simulation of the definite-range problem, approximation by an analytical model and use of empirical regression techniques.

Master of Science in
Operations Research
March 1986

Advisors: D.P. Gaver
J.N. Eagle
Department of
Operations Research

MASTER OF SCIENCE

IN

PHYSICS

THE RADIATION EFFECTS OF HIGH ENERGY ELECTRONS UPON THERMIONIC INTEGRATED CIRCUITS

William R. Arguello
Lieutenant, United States Navy
B.S., University of Utah, 1977

Thermionic Integrated Circuits (TIC) devices use a hybrid of vacuum tube and integrated circuit technology. The integrated circuitry is fabricated on a sapphire (Al_2O_3) substrate. A device was irradiated to attempt to establish a total dose (measured in rad Si) of radiation to cause the TIC device to malfunction. The TIC device was irradiated using 30 and 100 Mev electrons provided by the Naval Postgraduate School Linear Accelerator (LINAC). The device received a total dose of 1.8155×10^9 rad Si during the course of the experiments. It continued to function normally throughout the irradiation study, so it is concluded that the device is not sensitive to radiation, at least at the levels used.

Master of Science in Physics
December 1985

Advisor: F. Buskirk
Department of Physics

THE ATMOSPHERE AROUND SATURN'S RINGS: A STUDY OF THE PROBABILITY OF COLLISION BETWEEN RING PARTICLES AND ATMOSPHERIC MOLECULES

David Franklin Bedey
Captain, United States Army
B.S., Montana State University, 1977

An analytic model is developed to allow derivation of the probability that a molecule in the atmosphere of Saturn's rings collides with at least one ring particle when traversing the ring plane. The resulting expression involves details of the molecule's trajectory, including the velocity of the molecule relative to ring particles; thus, the theory is compatible with recently developed ballistic-transport computer models used in the analysis of the rings. The collision theory is applied to the case of a low energy, isotropic molecular production process to make inferences on the spatial extent of the ring atmosphere associated with such a source. The high frequency of collisions expected for the atmosphere in the vicinity of the A and B rings suggests a toroidal atmosphere.

Master of Science in Physics
June 1986

Advisor: R.L. Armstead
Department of Physics

CLASSIFICATION OF N-TYPE CARBON STARS

William Val Bollwerk
Lieutenant Commander, United States Navy
B.S., University of New Mexico, 1974

Low resolution spectrophotometry has been used to examine the relationship between spectral class and effective temperatures in a sample of eleven cool carbon stars.

Using effective temperatures from lunar occultation observations of Tsuji and Ridgeway et al, CN and C2 features have been examined for their utility as classification criteria. It is found that C2 strength is not a reliable temperature classification parameter, while CN should be useful.

Comparison of the carbon star classification systems of Keenan and Morgan and that of Richer with recently derived temperatures and the results of this study indicate that the Richer classification system more accurately reflects the temperatures of cool carbon stars.

Master of Science in
Physics
June 1986

Advisor: C.E. Irvine
Monterey Institute for
Research in Astronomy

STUDY OF OFF-AXIS RADIATION FROM RELATIVISTIC ELECTRONS TRAVERSING THROUGH MATTER

Richard Douglas Fitzpatrick
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

Results are presented from the study of the off-axis radiation field caused by a relativistic, mono-directional electron beam passing through water. Using the Naval Postgraduate School 100 MeV linear accelerator, off-axis radiation dose was measured with calcium fluoride thermoluminescent dosimeters placed at various path lengths out to two radiation lengths. The off-axis dose was calculated using the electron transport code CYLTRAN of the integrated TIGER series of coupled electron/photon Monte Carlo transport codes. Calculations were performed at Los Alamos National Laboratory. Comparison with the results is made and CYLTRAN is found to be in agreement with experimentally measured values. The extension of experimental results in one medium (water) to another (air) appears to be valid.

Master of Science in
Physics
December 1985

Advisor: X.K. Maruyama
Department of
Physics

INP:FE AND GAAS:CR PICOSECOND PHOTOCONDUCTIVE RADIATION DETECTORS

Phillip J. Keipper
Lieutenant, United States Navy
B.S., Ohio State University, 1975

The dark current, impulse and square-pulse response measurements of photoconductive devices fabricated from two different types of materials, Gallium Arsenide with Chromium dopant (GaAs:Cr) and Indium Phosphide with Iron dopant (InP:Fe) are reported. These devices have been subjected to irradiation from the Naval Postgraduate School S-band Electron Linear Accelerator (LINAC) with an energy of 100 MeV at room temperature. Fluence ranged between 10^{13} and 10^{16} electrons/cm^2. Dark current decreases with increasing fluence for the GaAs:Cr devices whereas InP:Fe shows an increase in the dark current. Both types of materials exhibit extremely fast impulse response after the irradiation. Electron mobility, drift velocity and response speed decrease with increasing fluence. Response speeds < 100-ps are achieved by fast carrier relaxation in the semiconductor due to the introduction of trapping and recombination centers resulting from the irradiation damage. The GaAs:Cr, unlike the InP:Fe, more closely follows the longer square-pulse exhibiting no nonlinearity. All results are consistent with previously investigated neutron irradiated devices.

Master of Science in
Physics
December 1985

Advisor: F.R. Buskirk
Department of
Physics

ANALYSIS OF CONTRAST SENSITIVITY AND SPECTRAL RESPONSE OF IMAGING SYSTEMS

Young Soo Kim
Lieutenant, Korean Navy
B.S., Korea Naval Academy, 1978

The characteristics of imaging systems CID, CCD and VIDICON were investigated in terms of the contrast sensitivity and the spectral response in the near infrared region. The object distance of 83.5cm, the radiant flux density of 0.93 microwatts/cm^2 and a black and white bar chart were used for the measurement of CTF. The spectral response was measured at 2520 ^{o}K using a tungsten light source. The CID image sensor has high sensitivity, resolving capability and spectral response at low light level comparing to the CCD or VIDICON. The limiting resolution values of 23.0 line-pairs/mm for CCD and 28.4 line-pairs/mm for VIDICON, the cutoff wavelengths of 1.0 micrometers for CCD and 0.94 micrometers for VIDICON were determined. The limiting resolution value and the cutoff wavelength for CID were much higher than those of CCD, or VIDICON and lay outside the range of this experiment.

Master of Science in
Physics
December 1985

Advisor: E.A. Milne
Department of
Physics

A SEAWATER BATTERY MONITOR WITH FIBER OPTIC REMOTE DATE ACQUISITION CAPABILITY

Yeon-Deog Koo
Major, Republic of Korea Army
B.S., Korean Military Academy, 1977

This thesis presents the basic design of the system to test the voltage of a 1 volt underwater battery at a long distance by using a fiber optic system. This system contains the voltage-to-frequency converter which converts the voltage of the battery to a variable frequency pulse train, the optical transmitter, the fiber optic receiver, and a frequency-to-voltage converter which converts the variable frequency pulse train into an output voltage. This system has small errors but if we use more precise components, we can get more exact results. Additionally, the lifetime of two kinds of batteries were measured by using this circuit.

Master of Science in
Physics
December 1985

Advisor: J.P. Powers
Department of
Physics

CERENKOV RADIATION, TRANSITION RADIATION AND DIFFRACTION TRANSITION RADIATION FROM PERIODIC BUNCHES FOR A FINITE BEAM PATH IN AIR

Arthur J. O'Grady
Lieutenant Commander, United States Navy
B.A., University of Rochester, 1972

Cerenkov, transition and diffraction transition radiation generated diffraction patterns are analyzed in order to determine whether a functional angular dependence exists to differentiate between these radiations. Experimental evidence is presented demonstrating differences in the diffraction pattern after specific changes are made during the experiment to identify transition radiation and diffraction transition radiation effects. Upon comparison with theoretical plots of Cerenkov radiation patterns, all three radiation effects can be isolated. This is significant in that there are no absolute boundaries between these three radiations and furthermore, Cerenkov radiation merges into transition radiation for a finite path length. Additionally, improvements in noise reduction in data recording have been made which lend further support to the validity of the equation for the power in the diffraction pattern of Cerenkov radiation from periodic bunches for a finite path in air as derived by Neighbours and Buskirk. It is also proposed that postulated noise-generated fine structure in previous experiments at NPSAL is partly caused by inherent transition and diffraction transition radiation.

Master of Science in Physics
June 1986

Advisor: F.R. Buskirk
Department of Physics

EFFECTS OF 30 MEV ELECTRON IRRADIATION ON INGAASP LEDS AND INGAAS PHOTODIODES

Patrick James O'Reilly
Captain, United States Army
B.S., United States Military Academy, 1978

InGaAsP LEDs and InGaAs photodiodes were irradiated with a 30 Mev electron beam. The rate of performance degradation and the effects of the increase in temperature during irradiations were studied. Simple models for LED and photodiode current controlling mechanisms and for a phenomenological radiation damage constant are presented. The dominant current controlling mechanisms and the peak wavelength of the LEDs and photodiodes did not change during irradiation. The light output of the InGaAsP LED decreased 63% and current output increased 8% at 10^{14} e/cm^2. Although the lifetime-damage constant product ($t_0K=1.5\times10^{-14}$cm^2/e sec) was of the same order of hardness as found for other III-V compound LEDs, this t_0K was considered very hard for a high radiance LED. The responsivity of the InGaAs photodiode degraded 54% and the dark current increased by more than 84 times at 3×10^{14}e/cm^2. The effect of radiation was greater when the devices were not operated during irradiation. Annealing was observed for both devices. The method used to calculate irradiation fluence at the Naval Postgraduate School's LINAC was refined (which increased previous fluence calculations by four times).

Master of Science in
Physics
June 1986

Advisor: K.C. Dimiduk
Department of
Physics

ELECTRON INDUCED CONDUCTIVITY OF AL_2O_3 AS PERTAINING TO THERMIONIC INTEGRATED CIRCUITS

Peter J. Peterson
Lieutenant, United States Navy
B.S., UW River Falls, 1973

Experiments were conducted to measure the electron induced conductivity (EIC) of single crystal sapphire (Al_2O_3) and polycrystalline alumina (Al_2O_3). The EIC is generated when the samples are bombarded with high energy electrons, utilizing the Naval Postgraduate school's S-band linear accelerator (LINAC). The EIC was measured at dose rates up to 6×10^7 rad (Si)/sec. The EIC for alumina was an order of magnitude smaller than the value for sapphire. The value calculated for alumina was 10^{-4} $(\Omega\text{-cm})^{-1}$ and 10^{-3} $(\Omega\text{-cm})^{-1}$ for sapphire. The response of EIC to a given dose rate did not change as the dose accumulated. Surface flashover problems during electron irradiation were observed and are discussed.

Master of Science in Physics
December 1985

Advisor: F.R. Buskirk
Department of Physics

ASPECTS OF SIMULATING INTERSTITIAL DIFFUSION IN A FACE-CENTERED-CUBIC LATTICE

Mark R. Polnaszek
Lieutenant, United States Navy
B.S., The Citadel, 1979

A simulation of interstitial diffusion through a face-centered-cubic crystal was developed to investigate the positional dependence of the diffusion coefficient. The simulation is an improvement over similar types of simulations because it keeps track of the nearest-neighbors and planar locations in arrays. These arrays enabled the simulation to investigate a more sophisticated system of diffusion, the face-centered-cubic crystal. The simulation provides output that can be used to develop the diffusion coefficient by both Fick's first law method and Fick's second law method. The simulation also allows one to determine a functional form for the diffusion coefficient if the positional dependence is indicated.

Master of Science in Physics
June 1986

Advisor: D.E. Harrison
Department of Physics

ELECTRON IRRADIATION OF N CHANNEL SILICON ON SAPPHIRE INSULATED GATE FIELD EFFECT TRANSISTORS (IGFET)

Robert A. Pornaras
Lieutenant Commander, United States Navy
E.E., University of Washington, 1977

SOS, n-channel, insulated gate field effect transistors (IGFETs) were irradiated at room temperature with a 30 MeV electron beam at doses from 10^4 to 10^6 Rads (Si). The effects of the irradiation on IGFET performance were evaluated by measuring threshold voltage, saturation transconductance and leakage current. Threshold voltage decreased after each irradiation, up to the highest dose. The threshold voltage behavior was as expected for an n-channel IGFET undergoing gate oxide charge build-up. The total dose was not large enough to exhibit threshold voltage increases indicative of interface state generation. The IGFETs were allowed to anneal for 107 hours at room temperature. The threshold voltage recovered to approximately sixty-five percent of its pre-irradiation value within thirty hours. It then increased slowly to about seventy-five percent of its pre-irradiation value by the end of the observed annealing time. Threshold voltage rebound was not observed. Saturation transconductance, device gain, increased initially above its pre-irradiation value. Irradiation at doses of 10^5 Rads (Si), or greater, caused the device gain to decrease from the peak value until it was about eighty percent of its pre-irradiation value at the maximum dose. A method for obtaining useful backchannel leakage current data is presented.

Master of Science in Physics
December 1985

Advisor: K. Dimiduk
Department of Physics

OPTICAL PHASE CONJUGATION BY FOUR-WAVE MIXING IN BARIUM TITANATE

James Roger Ryan
Lieutenant, United States Navy
B.S., Oregon State University, 1979

Photorefraction in a crystal of barium titanate can produce a phase conjugate replica of a laser beam through four-wave mixing. Barium titanate is unique because self generated conjugate returns will form from corner reflections. Self pumped optical phase conjugation was achieved at six wavelengths between 457.9 and 514 nm. Factors affecting the return included the laser wavelength, intensity, and angle of incidence with the c axis. The average return amounted to about 25% of the incident beam. The phase conjugate return interacted with the laser modes, significantly increasing the laser power.

Master of Science in Physics
March 1986

Advisor: D. Walters
Department of Physics

STUDY OF COMPUTER SIMULATION OF SPUTTERING FROM NITROGEN REACTED MOLYBDENUM AND TUNGSTEN TARGETS

Stephen McDonald Webb
Lieutenant Commander, United States Navy
B.S., University of Louisville, 1976

The Naval Postgraduate School simulation model, QDYN85, was used to investigate the sputtering of nitrogen reacted tungsten and molybdenum targets, where the nitrogen was placed in equilibrium positions both above and below the target surface plane. The cascades were initiated by bombarding the targets with argon ions with energies varying from 1 keV to 3 keV. The simulation results, when compared to experimental results obtained by Winters, indicate that the nitrogen position is not below the surface plane for either target but is located near the point where the adatom would be equidistant from its five nearest neighbours. Furthermore, the results show no multimer formation as a result of lattice fragmentation but do show dimer formation as a result of recombination above the target of individually sputtered atoms.

Master of Science in Physics
June 1986

Advisor: D.E. Harrison
Department of Physics

COMPUTER MODELING OF IR ENCOUNTERS AND COUNTERMEASURE EFFECTIVENESS

Jeffery Wade Wilson
Lieutenant, United States Navy
B.S., Oregon State University, 1978

Two computer modeling programs, LOWTRAN6 and DMAD have been converted for use at the Naval Postgraduate School. LOWTRAN6, used to model the propagation of optical radiation through the atmosphere at low resolution, has been modified to permit interactive use on the school's IBM 3033AP computer; two additional programs have been developed to provide interactive data acquisition and plotting.

DMAD has been implemented on a VAX-11/780 computer; it is used to model the effectiveness of infrared countermeasure decoys against infrared-seeking anti-ship missiles.

Work has also been conducted toward the conversion the FASCODE, an infinite resolution line-by-line transmittance/radiance code. The AFGL MAIN line parameters tape has been implemented on the IBM 3033AP.

Many computer programs presently used in the mathematical modeling of weapons and combat systems ignore some critical physical parameters. Using LOWTRAN6 data, the importance of including atmospheric parameters such as transmittance in a model such aa DMAD has been demonstrated.

Master of Science in
Physics
December 1985

Advisor: A W. Cooper
Department of
Physics

MASTER OF SCIENCE

IN

SYSTEMS TECHNOLOGY ANTISUBMARINE WARFARE (ASW)

THE EFFECTS OF COLOR, EXPOSURE TIME, AND TARGET DENSITY ON TACTICAL DISPLAY RECOGNITION TASKING

Thomas J. Concannon
Lieutenant, United States Navy
B.S., United States Naval Academy, 1979

Julie A. Rowell
Lieutenant, United States Navy
B.S., California State University, Long Beach, 1979

This study investigates the effects of a partially redundant color code on a visual search task. Monochrome and partially redundant color displays consisting of NTDS symbology, in concentrations of 18 targets and 36 targets, were displayed for 10 seconds and 60 seconds. Subjects were asked to reconstruct the plots immediately after viewing. The addition of color partial redundancy resulted in an overall enhancement of performance of 14.1% over the monochrome display.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
September 1986

Advisor: D.E. Neil
Department of
Operations Research

OCEANOGRAPHIC ANALYSIS OF SUN GLINT IMAGES TAKEN ON SPACE SHUTTLE MISSION STS 41-G

Mark G. Fischer
Lieutenant, United States Navy
B.S., University of Cincinnati, 1978

A series of four sun glint images taken by the crew of the space shuttle Challenger, mission STS 41-G, on 8 October 1984 were analyzed and compared to NOAA-7 AVHRR infrared images and to bathythermographs of the same area. Evidence of the Almaria Front, a persistant oceanographic feature east of the Alboran Basin, was found on all three data sets, and the efficacy of using sun glint images for the location of acoustically important oceanographic features was supported. A practical use of sun glint photographs taken from low earth orbit was demonstrated and the investigation of its use to help in the employment of acoustic sensors is further justified by this work.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
March 1986

Advisor: K.E. Woehler
Department of
Physics

C. Wash
Department of
Meteorology

A TAO ASW EXPERT SYSTEM PROTOTYPE

Gareth A. Gostlow
Lieutenant Commander, Canadian Armed Forces
B.S., University of Toronto, 1972

The expertise required by Tactical Action Officers in a modern Anti-Submarine Warfare environment of complex weaponry, minimal reaction time and arduous conditions at sea necessitate training and experience that is both extensive and progressive. For these officers to be effective in making accurate and timely decisions so as to effect the most appropriate responses, they must have ready access to current tactical doctrine and system performance statistics. In time of war there is no time to allow a junior Tactical Action Officer to progress to a level of competency; he must be a reliable, capable, fully functional warfare team member at the outset of his tour.

This thesis presents a prototype Artificial Intelligence model of the TAO ASW decision making process using an expert system development tool run on a microcomputer, to train fledgling TAO's with an outlook to the potential development and capability of an operational expert system.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
September 1986

Advisor: D.E. Neil
Department of
Operations Research

DECISION-MAKING PROCESS OF AN ANTISUBMARINE WARFARE COMMANDER

Douglas L. Robbins
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1976

This thesis represents a study of the decision-making process of an Antisubmarine Warfare Commander (ASWC). Several real world operational issues are analyzed and discussed as to how they can influence his thought process when making decisions. One approach to model this individual's thought process was accomplished by ALPHATECH, INC. By utilizing an ASW scenario, it evaluates how an ASWC makes his tactical decisions to track submarines based upon pieces of received acoustical information. In order to improve this model's representation of a realistic operational environment, a conceptual ASWC decision-making model is provided here.

Master of Science in
Systems Technology
(Antisubmarine Warfare)
September 1986

Advisor: D.E. Neil
Department of
Operations Research

MASTER OF SCIENCE

IN

SYSTEMS TECHNOLOGY COMMAND, CONTROL AND COMMUNICATIONS (C3)

A HEADQUARTERS EFFECTIVENESS ASSESSMENT TOOL (HEAT) EVALUATION OF HEADQUARTERS MILITARY AIRLIFT COMMAND (HQ MAC) POWDER RIVER 1985 (PR85) COMMAND POST EXERCISE (CPX)

Ronald P. Buettner
Captain, United States Air Force
B.A., Southern Illinois University of Edwardsville, 1977
M.S.B.A., Boston University, 1983

The purpose of this thesis is to investigate the use of the Headquarters Effectiveness Assessment Tool (HEAT) for a Command Post Exercise (CPX). Joint Chiefs of Staff (JCS) Exercise Powder River 1985 (PR85) at Headquarters Military Airlift Command (HQ MAC) was chosen for the evaluation. This thesis presents a description of the HEAT process, a description of HQ MAC's organization and interface with the Joint Deployment Agency (JDA), along with an historical accounting of the evaluation, its results, and recommendations.

Master of Science in
Systems Technology
(Command, Control and
Communications)
December 1985

Advisor: M.G. Sovereign
Department of
Operations Research

A FIELD ARTILLERY MODULE FOR THE AIRLAND RESEARCH MODEL

Leonard M. Finley, III
Captain, United States Army
B.S., United States Military Academy, 1975

The purpose of this thesis is to establish a portion of a high resolution, prescriptive field artillery module for the Airland Research Model which, when combined with the thesis of Captain Robin Lindstrom, produces a complete, operational field artillery module. The proposed module is a hierarchical representation of field artillery relationships and consists of one element of the Division Artillery, and an artillery battalion, to include the battalion headquarters, three firing batteries and all possible fire support personnel. The module contains both planning and execution components which can operate simultaneously to simulate the conduct of current operations while planning for future operations. Command and control processes are represented as equations based on a qualitative analysis of the command and control factors involved in each decision process. Where practical, data is represented by equations to increase execution speed.

Master of Science in
Systems Technology
(Command, Control and
Communications)
March 1986

Advisor: S.H. Parry
Department of
Operations Research

DEFENSE DATA NETWORK/TOPS-20 TUTORIAL: AN INTERACTIVE COMPUTER PROGRAM

Mark Klaus Herman Herkert
Lieutenant Commander, United States Navy
B.S., University of Wisconsin, 1974

Sheri Lynn Smith
Lieutenant, United States Navy
B.S., Texas A&M University, 1978

The DDNTUT program is an interactive tutorial, located on the ISIA host computer in Marina del Rey, California. The program is designed to first acquaint the new user on the Defense Data Network with the TOP-20 operating system and its executive level commands. Following this, the user is taken step by step through nine different programs available on TOPS-20, knowledge of which is integral to effective use of the network. The user can, at any time, quit the tutorial, return to previously studied sections, and/or skip sections he may be familiar with.

Master of Science in
Systems Technology
(Command, Control and
Communications)
December 1985 (Herkert)
March 1986 (Smith)

Advisor: G.K. Poock
Department of
Operations Research

EVALUATION METHODOLOGY FOR AIR DEFENSE COMMAND AND CONTROL SYSTEM

Patrick L. Gandee
Major, United States Air Force
B.A., University of California, Riverside, 1971

This thesis uses the Modular Command and Control (C2) Evaluation Structure (MCES) to formulate and address operational air defense command and control issues for the central European theater. (This evaluation structure provides a framework and tools to address C2 issues). The intent is to use the MCES along with the Identification Friend, Foe, Neutral (IFFN) testbed to address operational issues for this C2 system.

The result is a test of the MCES. The MCES approach is expanded with C2 theory and software design techniques. This expanded approach provides the means to build an air defense C2 systems model which can be synthesized to reflect operational employment of the C2 system. This model becomes a "descriptive tool" for analysts and C2 system users to define and evaluate measures to determine the C2 systems effectiveness. Representative measures are developed for the model at the subprocess (functional), C2 process and interactive process (C2 system) level.

Master of Science in
Systems Technology
(Command, Control and
Communications)
March 1986

Advisor: J.T. Malokas
Joint Command, Control
and Communications
Academic Group

USING VOICE RECOGNITION AS AN INPUT MEDIUM TO THE JINTACCS AUTOMATED MESSAGE PREPARATION SYSTEM (JAMPS)

Earl T. Hill
Captain, United States Army
B.S., United States Military Academy, 1977

Leo B. Kotowski
Captain, United States Air Force
B.S., United States Air Force Academy, 1980

This thesis investigates the interfacing of voice recognition, also known as automatic speech recognition (ASR), with the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) Automated Message Preparation System (JAMPS). The voice recognition system we used is the Texas Instruments (TI) TO-SPEECH (tm) imbedded in the TI Portable Professional Computer (PPC). We were able to load the JAMPS software onto the TIPPC's hard disk. With the vocabulary we built, we ran the JAMPS software on the TIPPC using voice recognition. Our results indicate ASR has an application in message preparation during military operations. ASR could curtail the time to prepare messages, and thereby reduce the time element in the command and control process. We propose a measure of performance to test how much time might be saved by using ASR with JAMPS. We also suggest some areas for future research.

Master of Science in
Systems Technology
(Command, Control, and
Communications)
March 1986

Advisor: G.K. Poock
Department of
Operations Research

COMMAND AND CONTROL IN THE FLEET BATTLE GROUP: AN ORGANIZATIONAL APPROACH

Anneliese Lillard Kennedy
Lieutenant, United States Navy
B.A., University of Tennessee, Knoxville, 1976

This thesis contains a brief overview of past developments in command and control, and applies organizational theory to the design of systems for tactical command and control, specifically within the context of the Fleet Battle Group. By applying Ashby's theory of requisite variety and Mintzberg's five coordinating mechanisms, a general model of tactical warfare is provided. The author proposes a balanced application of the five coordinating mechanisms to the problems of command and control within the battle group, or other tactical combatant organization.

Master of Science in
Systems Technology
(Command, Control and
Communications)
March 1986

Advisor: C.R. Jones
Department of
Administrative Sciences

THE EXTENSION OF UNIT ALLOCATION AND COUNTERMOBILITY PLANNING ALGORITHMS IN THE AIRLAND RESEARCH MODEL

Joseph R. McLaughlin
Captain, United States Army
B.S., United States Air Force Academy, 1976

This thesis extends the development of the AirLand Research Model (ALARM), an on-going research effort at the Naval Postgraduate School (NPS), in the areas of maneuver unit allocation and countermobility planning at the battalion level. The feasibility and desirability of multiple algorithms to determine enemy avenues of approaches into a battalion sector and to select the optimal position along the avenue for unit placement is demonstrated. The concept of analyzing terrain on the basis of flow rate, the ability to through-put a deployed attacker, is investigated. An algorithm linking unit placement and counter-mobility operations is developed. Additionally, shortcomings noted in ALARM by previous research are resolved. These developments have been coded into SIMSCRIPT and integrated into the existing model on the VAX 11/780 at NPS.

Master of Science in
Systems Technology
(Command, Control and
Communications)
March 1986

Advisor: S.H. Parry
Department of
Operations Research

SOVIET MILITARY THOUGHT - CONCEPTS OF WAR

Robert E. Orcutt, Jr.
Lieutenant Commander, United States Navy
A.B., College of the Holy Cross, 1973

Many Americans, including national policymakers and military officers, undoubtedly "mirror image" Western perspectives of the world onto their Soviet counterparts. In the military command, control, communications and intelligence (C3I) area this misguided approach can lead to incorrect analysis and gross miscalculation of enemy capabilities and intentions. This thesis is an attempt to sensitize the American military officer to a sampling of those cultural and ideological assymetries that can make Soviet approaches to war and C3I decision-making radically different from our own. Special emphasis is given to Soviet Marxist-Leninist views on peace, war, and military doctrine and science.

Master of Science in
Systems Technology
(Command, Control and
Communications)
March 1986

Advisor: J.G. Taylor
Department of
Operations Research

AN INVESTIGATION OF MULTILEVEL SECURITY AND ITS APPLICATION IN THE WARGAMING, RESEARCH, AND ANALYSIS (W.A.R.) LAB

James Allen Wall
Captain, United States Army
B.S., North Carolina State University, 1977

This thesis presents a discussion of automated data processing and storage in a multilevel secure environment. The paper covers areas such as the design and implementation of a security kernel; the DoD Computer Security Center's criteria for trusted computer systems and networks; and risk assessment when processing and storing sensitive or classified data.

One of the primary purposes of this paper is to serve as a handy reference for students in the Command, Control, and Communications curriculum at the Naval Postgraduate School who will research multilevel security and secure guard applications following the acquisition of the Gemini Trusted Multiple Microcomputer Base for the Wargaming, Research, and Analysis (W.A.R.) lab.

Additionally, a risk assessment of the W.A.R. lab was conducted and the possibilities of converting the facility into a multilevel secure computing environment were investigated.

Master of Science in
Systems Technology
(Command, Control and
Communications)
March 1986

Advisor: T.J. Brown
Department of
Electrical and
Computer Engineering

ON LIMITED WAR, ESCALATION CONTROL, AND COMMAND, CONTROL AND COMMUNICATIONS

Geo. Mark Waltensperger
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B.S., Eastern Michigan University, 1976

This thesis is an unclassified examination from a Western perspective of the concepts of limited war, and escalation control in the context of nuclear conflict and command, control and communications (C3). Limited war and escalation control are intrinsically related. To better understand the relationships between limited war, escalation control and C3, as applied to the question of protracted nuclear war, this thesis considers strategic control from a cybernetic view, using a widely accepted model for the command and control process. U.S. strategic C3 systems are discussed from the perspective of limiting war and controlling escalation. Requirements such as: a viable National Command Authority, effective command and control, positive/negative control, damage control/assessment, a shared concept of limited war, civil defense, and a mechanism to terminate conflict are presented as necessary to control escalation, thus, limiting war.

Master of Science in
Systems Technology
(Command, Control and
Communications)
March 1986

Advisor: J.G. Taylor
Department of
Operations Research

MASTER OF SCIENCE

IN

SYSTEMS TECHNOLOGY SPACE SYSTEMS OPERATIONS (SSO)

SATELLITE ORBIT PROGRAMS UTILIZING THE GRAPHICS CAPABILITIES OF THE MICROCOMPUTER

Kim Alldredge Langdorf
Captain, United States Army
B.A., University of Utah, 1977

It is important for a student of Space Science to have the opportunity to thoroughly understand the principle of an artificial satellite orbit. This thesis consists of four computer graphics programs that will enable the student to see what an orbit is and how it works. The first program demonstrates the shape of an orbit in two dimensions resulting from initial altitude, speed, and flight path angle. The second program draws an orbit in three dimensions around a sphere based on the input of the classical orbital elements. The third program traces the ground track of a satellite over a map of the earth. And the fourth plots the ground track of a geosynchronous satellite over a map of the earth. The student can learn about orbits by entering the orbital elements and viewing the resultant orbit.

Master of Science in
Systems Technology
(Space Systems Operations)
June 1986

Advisor: G.L. Swafford
Department of
Physics

AN INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND ITS POTENTIAL USE IN SPACE SYSTEMS

Gary Wayne McDonald
Lieutenant, United States Navy
B.A., Western Washington University, 1975
M.Ed., Western Washington University, 1976

This thesis provides an introduction to Artificial Intelligence and Space Systems, with comments regarding their integration. The survey of Artificial Intelligence (AI) is based upon a review of its history, philosophical development, and subcategories of its current technologies. These subcategories: are Expert Systems (ES), Natural Language Processing (NLP), Computer Vision and Pattern Recognition, and Robotics and Autonomous Vehicles. Emphasis is then directed toward the description of the fundamental characteristics of a generic space system, including the space bus components, mission system components, ground node functions, and system missions. It is concluded that AI, in spite of its immaturity as a science, will prove to be a beneficial component of future space systems.

Master of Science in
Systems Technology
(Space Systems Operations)
June 1986

Advisor: H.H. Loomis, Jr.
Department of
Electrical and Computer
Engineering

ALFRED THAYOR MAHAN AND SPACE: A NECESSARY UNITY

Mark T. Sandvigen
Lieutenant, United States Navy
B.S., Southern Oregon State College, 1980

This thesis is an unclassified examination from a Western perspective, of the current and projected space efforts of the world and how they effect current U.S. Space policy. There is currently no universally accepted space strategy to help in meeting the policy goals of the United States. It is the hypothesis of this thesis that the strategies needed to deal effectively with future space development were layed down in the past by Alfred Thayer Mahan and others. In order to outline a current strategy an analysis was conducted of current space programs, future space efforts, orbitology/orbital mechanics, and the writings of H. Jomini, A.T. Mahan, and Sir Julian Corbett. In order to manage and arrange the large knowledge base, a systems model was developed and used in this analysis. Upon the completion of the analyses, a blending of the Mahan and orbital mechanics was conducted in order to show, by analogy, that there exist parallels between that of naval strategy and strategies needed to reach U.S. policy goals.

Master of Science in
Systems Technology
(Space Systems Operations)
June 1986

Advisor: J.G. Taylor
Department of
Operations Research

MASTER OF SCIENCE

IN

TELECOMMUNICATIONS SYSTEMS MANAGEMENT

PROPOSED MODEL FOR FORECASTING DEMAND FOR TELECOMMUNICATIONS SERVICES FOR THE UNITED STATES NAVY

Rosalind T. Bailey
Lieutenant Commander, United States Navy
B.S., Indiana University, 1974

The purpose of this thesis is to examine several forecasting models for predicting demand for telecommunications services. The research addresses the determinants of demand under different conditions and examines the decision makers choice in choosing one particular method as opposed to another. After reviewing and critiquing the models, the author proposes a number of considerations in constructing a model for use in assessing the demand for telecommunications services by the United States Navy.

Master of Science in
Telecommunications Systems
Management
March 1986

Advisor: J.W. LaPatra
Department of
Administrative Sciences

SHIP-SHORE PACKET SWITCHED COMMUNICATIONS SYSTEM

Rex A. Buddenberg
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1972

This thesis presents an architecture for ship-shore sea service communications. Starting with the ARPANET packet switching model (TCP/IP), Network and Logical Link layers are defined which deal with the following problems:

1) Many ship-shore links are one way only. A Network level acknowledgement protocol to work under TCP/IP, integrates multiple, heterogeneous, one-way links into a complete network.

2) Conventional network access procedures are invalid in HF ship-shore communications because the assumption that ships can hear each other transmit cannot be made. Two network access techniques are presented.

3) HF communications are characterized by low capacity and high noise. A Logical Link layer to manage these is presented.

These three major topics are integrated into a complete system using the ISO reference model. The following is achieved:

1) A fully integrated system across all frequencies.

2) ARPANET/DDN interconnect capability.

3) Efficient, effective HF links.

Master of Science in
Telecommunications Systems
June 1986

Advisor: P. Cooper
Department of
Administrative Sciences

NETWORK MANAGEMENT IN AN EMERGENCY COMMUNICATIONS SYSTEM

Richard L. DeLorey, Jr
Lieutenant, United States Navy
B.A., Providence College, 1970

This thesis begins with a synopsis of contemporary knowledge concerning network management as it has been implemented in a modern communications network, and as it has been postulated by experts in the fields of systems engineering and systems management. It then provides a summary of known operational requirements for a generic emergency communications system, as well as speculation on potential requirements for future application. Finally, it combines the knowledge of network management with the known and projected operational requirements into a proposal for a network management system capable of supporting a generic emergency communications network.

Master of Science in
Telecommunications Systems
Management
March 1986

Advisors: J.W. LaPatra
D. Moses
Department of
Administrative Sciences

AN EVALUATION OF THE EFFECTIVENESS OF SNTI, AN INTEGRATED SHIPBOARD COMMUNICATIONS SYSTEM, FOR USE ABOARD U.S. NAVY SURFACE COMBATANTS

G. Bartlett Farrell
Lieutenant, United States Navy
B.A., College of the Holy Cross, 1978

Shipboard Interior Communication (IC) systems, a critical part of command and control, have not kept pace with the technological advances occurring in other areas of Naval warfare. As a result, the requirements and demands placed on an IC system in a warfare scenario are not likely to be met with much success. This thesis takes the first steps towards rectifying this unsatisfactory situation. The general weaknesses and problems with present IC systems are identified. Then, paying close attention to the needs of surface combatants, particularly DDG-51 and FFG-7 class ships, the requirements and functions needed to improve shipboard IC are presented. These are incorporated into the requirements and functions needed to develop an ideal Integrated Shipboard Communication System (ISCS). A French designed and built ISCS is then compared to this ideal system in order to evaluate its potential for implementation aboard U.S. Navy surface combatants.

Master of Science in
Telecommunications Systems
Management
March 1986

Advisor: J.W. LaPatra
Department of
Administrative Sciences

DO COGNITIVE STYLES AFFECT THE PERFORMANCE OF SYSTEM DEVELOPMENT GROUPS?

June A. Gaston
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B.S., East Carolina University, 1977

Communication systems requirements analysis is an essential ingredient for developing new communication systems. Unfortunately, system development groups consisting of system users, analysts, and managers have not been very effective in performing the requirements analysis. Users have been unable to communicate what they want, the technical ideas suggested by the analysts reflect their particular interests, and the managers have been unable to facilitate the interactions between the users and the analysts. This has resulted in systems that are inadequate.

Many techniques have been suggested to improve the effectiveness of system development but none have been particularly useful. There has been recent evidence to indicate that poor requirements analysis is related to the cognitive styles of the members of the system development groups. It suggests that a mix of possible cognitive styles is required for effective system analysis and design, and that imbalances of cognitive styles may contribute directly to poor system performance.

This thesis evaluates the status of measuring group performance and considers the useful tools for measuring coonitive styles. The emphasis is on the Myers-Briggs Type Indicator and its utility as the primary tool for determining cognitive styles.

Master of Science in
Telecommunications Systems
Management
March 1986

Advisors: J.W. LaPatra
M.P. Spencer
Department of
Administrative Sciences

LOCAL AREA NETWORK STANDARDS AND GUIDELINES FOR U.S. MARINE CORPS APPLICATIONS

Timothy J. Himes
Major, United States Marine Corps
B.A., Welsh College, 1969

This thesis highlights the need for specific guidance and standards in the U.S. Marine Corps local area network (LAN) specification and selection process. Media, topologies, components, access methods, protocols, standards and other technologies are used to characterize the current technical environment. A strategy for LAN specification and selection is presented. This strategy stresses top-down, user requirement, protocol performance-oriented techniques vice the bottom-up, technical design selection oriented techniques in use today. Thorough documentation of user requirements, higher-level services, higher-level protocols, and an information and networking strategy along with other considerations like facilities/support, expected general performance, network management, and security is the method proposed for preparation of a complete specification document. A centrally coordinated U.S. Marine Corps specification and design database is also proposed to ensure future interoperability, connectivity, and support.

Master of Science in
Telecommunications Systems
Management
March 1986

Advisor: J.W. LaPatra
Department of
Administrative Sciences

A METHODOLOGY TO AID THE COAST GUARD IN THE DECISION TO PROCURE OR MAINTAIN TELECOMMUNICATIONS SYSTEMS

Michael Dean Inman
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1980

This thesis develops a methodology that is designed to aid the Coast Guard decision-maker in the determination of whether to procure a new telecommunications system or maintain a present telecommunications system. The thesis delineates the system cost factors, and the performance measures of the systems that are important for the evaluation of the two systems (present or proposed). An approach is then developed using the cost and performance information, which results in marginal benefit/marginal cost ratios. These ratios become the principal evaluation measures in a multi-criteria framework for solving the decision problem. The decision-makers preferences are solicited and integrated with the evaluation measures by employing the Analytic Hierarchy Process. The end result is a recommendation for the preferred system which is based on the correct marginal criteria and incorporates the relevant preferences and implicit trade-offs. This uses "off the shelf" software.

Master of Science in
Telecommunications Systems
Management
June 1986

Advisor: K.D. Wall
Defense Resources
Management Education
Center

SPREAD SPECTRUM SYSTEMS: A POINT OF VIEW BETWEEN TECHNOLOGY AND MANAGEMENT

Thomas P. Katopodis
Lieutenant Commander, Hellenic Navy
B.S., Hellenic Naval Academy, 1970

Only recently has technology come to the point of making circuitry and systems reasonably small, reliable, and inexpensive so as to enable practical implementations of spread spectrum (SS) concepts. Viewed as a motivating force encouraging the growth of the field, this recently developed capability for practical SS systems must be reinforced by the additional pressure of more and greater demands being made on communications systems than ever before. Increased message traffic from a higher number of users is creating a need for protection of information from interference and eavesdropping. As a result of these two major forces, the availability of systems and components coupled with the need for improved communications, the field of SS communications has rapidly emerged in recent years as a major thrust in the technical community. This thesis provides a summary of the principles upon which SS systems have developed and the progress of frequency management involving spread spectrum systems.

Master of Science in
Telecommunications Systems
Management
September 1986

Advisor: T.J. Brown
Department of
Electrical and Computer
Engineering

A METHODOLOGY FOR CHARACTERIZING A GENERIC LOCAL AREA COMPUTER NETWORK

Thomas L. Koontz
Lieutenant, United States Coast Guard
B.S., United States Coast Guard Academy, 1979

This thesis establishes a methodology for a manager of information systems to use when choosing a local area network (LAN) for an organization's computer communications. The methodology proposed describes the various decisions about a network that must be made, and the alternatives available. The outcome of the methodology will be a generic set of specifications for a basic communications LAN that the manager can use to find an adequate network.

This thesis is designed to introduce prospective LAN purchasers to LAN concepts and problems, and to give them a grasp of aspects of LAN technology that need to be considered before a LAN can be purchased. It is not a detailed guide to network engineering and implementation.

This thesis specifically addresses the major elements of the basic communications LAN. The higher level attributes of a LAN including applications, control and outside interfaces are not included.

Master of Science in
Telecommunications Systems
Management
June 1986

Advisor: M.P. Spencer
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Administrative Sciences

DEFENSE DATA NETWORK: USAGE SENSITIVE BILLING

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Lieutenant, United States Navy
B.A., Mary Washington College, 1975

The Defense Data Network (DDN) program plan approved by the Office of the Secretary of Defense (OSD) on 2 April 1982 and subsequent OSD policy guidance on DDN provides for the eventual recovery of applicable network costs by billing of subscribers based upon their utilization of network resources. This thesis will examine the present billing scheme utilized for recovery of DDN costs as well as an alternative usage sensitive billing scheme to satisfy the OSD mandate.

Master of Science in
Telecommunications Systems
Management
June 1986

Advisor: C. Wunderly
Department of
Administrative Sciences

A USER-ORIENTED PERFORMANCE INDEX FOR PACKET SWITCHED NETWORKS

Mark E. Speck
Lieutenant, United States Navy
B.S., St. Mary's College, 1977

As packet switched networks become more widely used, there will be a need to characterize network performance with an index that defines how well the network can meet the user's needs. This thesis explains present and future measures of network performance, some of which are user-oriented, and how they can be useful. Dividing users into groups based on user needs, a model of a composite performance index is developed. The usefulness of this index, if provided on a real-time basis, is then explored and substantiated.

Master of Science in
Telecommunications Systems
Management
March 1986

Advisor: J. LaPatra
Department of
Administratative Sciences

COAST GUARD HIGH FREQUENCY SITOR AND DIGITAL SELECTIVE CALLING OPERATIONAL REVIEW AND TEST PLAN

James E. Spence
Lieutentant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1974

The areas of increased SITOR communications and the effects of Digital Selective Calling (DSC) on Coast Guard Communications primarily in distress frequency guarding are studied. To determine how SITOR might be utilized for Coast Guard communications and how its use with merchant vessels could be expanded, the communications capabilities and functions of the major classes of Coast Guard cutters and a Communications Station are briefly described. The potential uses of SITOR on cutters are then discussed and the cost benefits that might be realized by increasing SITOR use between merchant vessels and Communication Station rather than HF CW is indicated. A test plan for SITOR communications and DSC operations in the Fourteenth Coast Guard District is provided for a late Fiscal Year 1986 test.

Master of Science in
Telecommunications Systems
Management
June 1986

Advisor: C.R. Jones
Department of
Administrative Sciences

MAXIMIZATION OF THE CAPACITY OF THE MOST SURVIVABLE CONNECTIONS IN A NETWORK

Richard V. Stockton
Lieutenant, United States Navy
B.B.A., University of Oklahoma, 1979

The survivability of a communications network is considered to be a function of the number of independent parallel paths between a source and destination node. A methodology is developed to determine the connectivity of a network and then the number of independent parallel paths are determined by restricting the connectivity solution set. The capacity of the parallel paths are then maximized given that the links are not characterized by uniform capacities.

Master of Science in
Telecommunications Systems
Management
March 1986

Advisor: J.W. LaPatra
Department of
Administrative Sciences

MASTER OF ARTS

IN

NATIONAL SECURITY AFFAIRS

JAPAN'S EMERGING ROLE AS AN ASIAN-PACIFIC POWER

Edward O. Andrews
Captain, United States Air Force
B.S., United States Air Force Academy, 1980

In view of the rapidly changing security environment surrounding Japan--the growing Soviet military buildup, the relative decline of U.S. military, economic, and diplomatic power, and the growing influence of its regional neighbours in the Asian-Pacific region, the time has arrived for Japan to consider assuming greater responsibilities in its security and diplomatic policies.

Until recently, Japan, despite its strong economy has had no clearly defined role either in international politics or in the politics of the Asian-Pacific region. This thesis examines how Japan is becoming increasingly aware that it must play a more active role in the Asian-Pacific region and of the responsibilities it should assume for regional development. In addition, this thesis examines Japan's position and relations with the countries in the Asian-Pacific region, and considers the problems and options which face Japan in its quest for a comprehensive and credible strategic plan for maintaining its national security.

Master of Arts in
National Security Affairs
June 1986

Advisors: E.A. Olsen
C.A. Buss
Department of
National Security Affairs

THE ICARUS ILLUSION: TECHNOLOGY, DOCTRINE AND THE SOVIET AIR FORCE

Steven K. Black
Captain, United States Air Force
A.B., University of Michigan, 1980

This thesis describes and analyzes the relationship between post-World War II Soviet fighter aircraft design and Soviet air employment doctrine. It tests the proposition that Soviet fighter aircraft are developed in response to design criteria established solely on the basis of military requirements. The results show that Soviet fighter design has not only progressed largely independently of prevailing doctrinal requirements, but appears to have driven the development of tactical air employment doctrine over the past forty years.

Master of Arts in
National Security Affairs
September 1986

Advisor: J.A. Dellenbrant
Department of
National Security Affairs

COMBATING TERRORISM: A GUIDE FOR U.S. NAVAL FORCES AFLOAT

Hubert Lee Broughton, II
Lieutenant Commander, United States Navy
B.S., University of West Florida, 1971

The United States Navy's forces afloat do not have a single source document that addresses anti-terrorism and counterterrorism. The i ease in terrorism world-wide has stimulated the concern that vulnerable maritime vessels will become terrorist targets. U.S. Navy ships in a restricted maneuvering situation, at anchor in a harbor, or moored pierside may offer an attractive target to a terrorist group. To deal with this potential terrorist threat, personnel manning U.S. Navy ships must be educated in the fundamentals of terrorism; the ships' security program must be evaluated and modified accordingly; various watches, sentries, and teams must be trained in new anti- and counter-terrorist procedures; and contingency plans must be developed to deal with potential terrorist incidents. This study provides a guide for the developmetn of effective anti-terrorist and counterterrorist programs for any ship type in the U.S. Navy.

Master of Arts in
National Security Affairs
December 1985

Advisor: R.H.S. Stolfi
Department of
National Security Affairs

POLITICAL CONSIDERATIONS IN DEVELOPING MEASURES OF EFFECTIVENESS FOR STRATEGIC DEFENSE

Robert J. Cerwonka
Lieutenant, United States Navy
B.S., Pennsylvania State University, 1979

This thesis develops a Measure of Effectiveness (MOE) for strategic defenses from open source political literature. First, an examination of the doctrines and strategic nuclear force structures of the United States and the Soviet Union is conducted to illuminate the primary challenges to a U.S. system of strategic defense. Second, the issue of utilizing strategic defense for the protection of U.S. retaliatory nuclear forces (counterforce enhancement) is addressed. Third, the degree of effectiveness which a counterforce enhancing system of strategic defense must meet is established through the definition of minimal retaliatory assets required to effect U.S. targeting plans. Finally, the conclusions and findings of this research are presented in a summary chapter.

Master of Arts in
National Security Affairs
March 1986

Advisor: K.M. Kartchner
Department of
National Security Affairs

CONFLICT RESOLUTION: A COMPARATIVE ANALYSIS OF THREE AFRICAN CASE STUDIES

Thomas John Culora
Lieutenant, United States Navy
B.F.A., School of Visual Arts, 1979

Conflict Resolution is a process in which two or more players, holding dissimilar perceptions of a central issue in a dispute, employ strategies consonant with the resources they hold to obtain their goals in the conflict.

This thesis examines this process in three contemporary conflicts on the African continent--the Sudan civil war, the Zimbabwe/Rhodesia independence crisis, and the continuing conflict in Namibia. A checklist was developed to establish a theoretical framework for examining the key elements in each conflict. The interaction of these elements--the issues, goals, strategy, resources and limitations and the patterns that evolve from this interaction is analyzed from the perspective of the African continent and within the context of conflict resolution.

The primary objective of this project is to provide a comparative analysis of the three conflicts selected for study to gain increased insight into the dynamics of each case and to expand upon the theoretical and practical understanding of conflict resolution.

Master of Arts in
National Security Affairs
June 1986

Advisor: D. Winterford
Department of
National Security Affairs

THE SOVIET CENTRAL ASIAN CHALLENGE: A NEO-GRAMSCIAN ANALYSIS

Allen E. Dorn
Captain, United States Air Force
B.S. United States Air Force Academy, 1980

The Soviet Union faces a revolutionary challenge from its Central Asian Muslim population which is capable of undermining Soviet authority in the region. This thesis establishes a neo-Gramscian theory for analyzing the Soviet Central Asian challenge as a developing counterhegemonic movement against the Russian-dominated State. Antonio Gramsci's theory of hegemony and counterhegemony explains the mechanism of rule essential for group control of a state as well as the mechanism of revolt required to permit a subordinate group to stage a successful social revolution. For the purpose of this thesis, traditional Gramscian theory was broadened to allow its application to societies like the Soviet Union where the dominant division of civil society is not economic class but rather nationality group. From this neo-Gramscian perspective, the Soviet Union is a "State of nations" hegemonically ruled by a single nation - the Russian nation - through a national ideology - Russian communism. The Central Asian counterhegemonic challenge to Russian hegemony revolves around three key issues: the rapidly expanding Muslim population of the region, the continued strength of Soviet Islam and Sufism, and Central Asia's Muslim nationalism. This thesis concludes that the Soviet Central Asian challenge appears capable of producing a successful Gramscian counterhegemonic revolution against the Soviet State without foreign aid or support.

Master of Arts in
National Security Affairs
September 1986

Advisor: J.A. Dellenbrant
Department of
National Security Affairs

THE KEY TO MIDDLE EAST PEACE: SOLVING THE ARAB-ISRAEL CONFLICT

Luther Bernard Foley
Lieutenant Commander, United States Navy
B.S., University of Hawaii, 1976

This thesis analyzes the requirements of Israel and the Palestinians in reaching a settlement of the Arab-Israeli conflict. The author covers previous attempts at settlement, the foundations of which were laid by United Nations Resolutions. The thesis also puts forth a new peace initiative which the author feels is the only hope left for the Palestinian people to regain a portion of their homeland.

Master of Arts in
National Security Affairs
December 1985

Advisor: J.W. Amos
Department of
National Security Affairs

SECURITY IMPLICATIONS OF U.S. ARMS TRANSFERS TO CHINA

Jer Donald Get
Major, United States Army
B.S., United States Military Academy, 1973

This thesis is an evaluation of the soundness of the Reagan administration's policy for transferring arms to the People's Republic of China, with a sound policy defined as one in which the potential benefits outweigh the assessed risks. The evaluation begins by tracing the policy's historical development. This is followed by an investigation into the rationale behind both the United States' and China's participation in arms transfers with each other. The policy evaluation is completed with benefit, cost and risk analyses. The evaluation indicates that the Reagan administration's arms transfer policy for China is the result of an evolutionary rather than a revolutionary development. It should be mutually beneficial to the U.S. and the People's Republic of China, and is sound since its potential benefits outweigh its probable risks.

Master of Arts in
National Security Affairs
June 1986

Advisor: C.A. Buss
Department of
National Security Affairs

THE INF CONTROVERSY: A CONFLUENCE OF FOREIGN AND DOMESTIC INTERESTS

Phillip Joseph Gick
Captain, United States Army
B.A., Indiana University, 1976

The study examines national interest theory in the light of the INF controversy. The perceptions and positions of the United States, the Soviet Union, France, the United Kingdom, and several non-nuclear members of NATO are examined and analyzed. The analysis is concerned with alliance and transnational considerations, military capabilities, and domestic political constraints. Where necessary the historical and cultural perceptions, as well as the strategic requirements of the nation involved, are factored in. The study concludes with an overview of the options available to the nations involved in the INF controversy.

Master of Arts in
National Security Affairs
September 1986

Advis[illegible]: [illegible] M. Tet[illegible]
[illegible]partment of
[illegible]tic [illegible] Security Affairs

THE QUEST FOR REGIME LEGITIMACY AND STABILITY IN THE GDR: THE DETERMINANT OF POLICY

Mark N. Gose
Lieutenant, United States Air Force
B.A., New Mexico State University, 1982

Since the end of World War II, the German Democratic Republic has been forced to confront the circumstances of its creation and existence as the "other Germany," and its leaders determine policy with this in mind. Consequently, the ruling Socialist Unity Party must constantly strive to attain domestic legitimacy and stability for itself. This quest has acted, and continues to act, as a major determinant of East German foreign and domestic policies - policies which sometimes differ from those of the USSR. Therefore, this paper analyzes the means by which the SED regime attempts to attain domestic legitimacy, and hence stability, for itself.

First, domestic policies designed to achieve legitimacy/stability goals are outlined. These include political culture, party recruitment, political socialization, and social policy. Second, the role of economics in attaining regime legitimacy is explored and shown to be another major implement. Third, East German relations with the Soviet Union, West Germany, the Warsaw Pact, and the Third World are discussed in the context of six issues. These issues serve to illustrate the dominance of legitimacy and stability concerns in East German foreign policy. The last section of this paper discusses American policies relative to Central Europe; the SED's quest for legitimacy and stability is found to affect American decisionmaking in the region - in past, present, and future policies.

Master of Arts in
National Security Affairs
September 1986

Advisor: P.J. Garrity
Department of
National Security Affairs

DECEPTION IN SOVIET MILITARY DOCTRINE AND OPERATIONS

David L. Hamilton
Captain, United States Air Force
B.A., Harding University, 1977

This thesis analyzes the role deception serves in the armed forces of the Soviet Union. The analysis focuses on the Soviets' mindset, historical application, military doctrine, organization, and current application of military deception. Before addressing the Soviet use of deception, an introduction is provided which includes some definitions and related terms, a historical look at deception, and some basic deception principles. The thesis closes with a summary of the main points concerning Soviet military deception and briefly compares it to past and current application of deception in the U.S. military.

Master of Arts in
National Security Affairs
June 1986

Advisor: J. Valenta
Department of
National Security Affairs

DESTINY IN THE PACIFIC: IMPLICATIONS FOR U.S. POLICY OF RISING JAPANESE NATIONALISM AND ECONOMIC POWER

Gerald D. Hill, III
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B.S., United States Military Academy, 1975

The thesis of this paper is that rising Japanese economic power has been reinforced over the last decade by a traditional sense of nationalism and pride in Japan. This swell of sentiment has at its roots the same components which led to the growth of militarism in the 1930's. This paper examines the growth of modern nationalism in Japan through this century, stressing those components of the culture and the environment which are common to both pre- and post-World War II Japan.

The clear theme gleaned from Japanese actions in this century is her faith in her own destiny as an international leader. Current U.S. policy with regard to trade and defense toward Japan is too heavy-handed, too likely to produce a backlash of sentiment in Japan in the coming years. The U.S. needs a policy which recognizes the Japanese view of their role in the world but at the same time draws them into a position supportive of U.S. interests in the Pacific and the world. This paper concludes by proposing a new policy for the U.S. which accords best with the cultural, economic, and political developments of modern Japan.

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TURMOIL, TRANSITION .... TRIUMPH? THE DEMOCRATIC REVOLUTION IN THE PHILIPPINES

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In November of 1985, Ferdinand Marcos, President of the Republic of the Philippines, announced that he would hold a "snap" Presidential election. This election took place on 7 February 1986, in a highly charged atmosphere of partisan politics marked by intimidation, widespread poll irregularities, and intense domestic and foreign scrutiny. The United States' official position remained fluid in an attempt to balance U.S. strategic and economic national interests with those of the Filipino people. The essential Philippine national interest at stake was the viability of the democratic process as an expression of the will of a free people. Following a hotly disputed count the incumbent President Marcos claimed victory, a move similarly taken by his opposition opponent, Mrs. Corazon Aquino. The resulting civil strife threatened peace in the Philippines and posed significant questions for U.S. foreign policy, specifically, the relative priority of democratic values vis a vis strategic interests and the role of the United States in mitigating the rise of a communist insurgency there. This is a case study of the development of that election and the role that the United States did and could have played in it. Additionally, it examines the national interests of both countries as expressed during and after the election.

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INITIATIVE IN SOVIET AIR FORCE TACTICS AND DECISION MAKING

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This thesis discusses the evolution of individual initiative in fighter tactics of the Soviet Air Force. World War II forced pilots to break from restrictive tactics and to develop and use initiative in combat. By war's end, Soviet fighters' initiative greatly resembled western fighters'. However, since WWII technology and doctrine led to an increase in control measures and a decline in initiative. Despite this, veterans of combat have consistently spoken out for realistic training and the freedom for fighter initiative. As a result, emphasis on initiative rose in the late 1970's. But current Soviet pilots do not come close to having the initiative of WWII fighters and the recent emphasis on initiative may be short-lived. Current technology gives the Soviet Air Force the choice of developing or extinguishing initiative among their fighters. History suggests that without a threat to their survival the choice against initiative will be made.

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SENDERO LUMINOSO: ORIGINS, OUTLOOKS, AND IMPLICATIONS

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The Sendero Luminoso, or Shining Path rebellion in Peru, was launched during the summer of 1980. Although the group was relatively unknown, and initially dismissed as a weak and unimportant movement among the Indian peasants of the Andean highlands, the Sendero guerrillas have proven to be a resilient and dedicated threat to the Peruvian democratic regime.

This thesis examines the Sendero Luminoso question from three different perspectives. Their use of Maoist strategy and tactics as interpreted by Abimael Guzmán is discussed at length. The counterinsurgency program is analyzed to explain its failures and offer suggestions for improvement. Finally, the problem is reviewed from the aspect of the central government during the last two decades.

It is concluded that although Sendero Luminoso poses no immediate threat to assume power, the guerrillas possess the capability to inflict damage for at least the near future. Recommendations for United States policy regarding Peru and Sendero Luminoso are included in the final chapter.

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CHANGING AMERICAN ASSESSMENTS OF THE SOVIET THREAT IN AFRICA: 1975-1985

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Perceptions of the Soviet Union as a threat to the national interests of the United States affect virtually every aspect of American policy. Differing assessments of the threat necessarily require different policy responses. It is important to understand the range of differing assessments in order to support a coherent American foreign policy.

This study identifies and explicates the components of a threat assessment in order to categorize different images of the Soviet threat. Four different images are examined, two of which appear to change over time. Finally, changes in liberal and conservative assessments of the Soviet threat in Africa from 1975-1985 are detailed in order to demonstrate that changing assessments are directly related to the core elements of each image.

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SOVIET DISSENT AND THE AMERICAN NATIONAL INTEREST

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Soviet dissent is not a homogeneous movement; it is composed of a myriad of individuals and groups, seeking a variety of goals and objectives. Nevertheless, the phenomenon can be described relative to three basic interests: national self-determination, a desire for religious liberty, and guarantees of civil and political freedoms. Despite a host of aggresive campaigns by the state to eliminate the phenomenon, dissent continues to persist. Thus dissent poses the greatest long-term threat to the Soviet regime since it represents the primary mechanism by which all other factors of regime instability are both enunciated and perpetuated.

American foreign policy support to Soviet dissidents provides the United States with strategic advantages relative to the Soviet Union. For this reason, as well as for moral and legal considerations, it is in the American national interest to continue support to the various dissident movements in the USSR. Such assistance is in keeping with American values regarding a respect for human rights and is consistent with U.S. diplomatic history.

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DEFENDING NORWAY AND THE NORTHERN FLANK: ANALYSIS OF NATO'S STRATEGIC OPTIONS

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The purpose of this study is to determine an appropriate strategy for the defense of NATO's Northern Flank. If NATO fails to successfully defend this Flank, its vital North Atlantic SLOCs will be severely threatened and the rear of the Central Front will be exposed to attack from the sea. Norway's strategic location makes it the key to the defense of the region. Deterrence, the defense of Norway, and the protection of the Atlantic SLOCs are the fundamental goals of NATO in the region. Under current conditions NATO must meet two basic objectives to achieve these goals--the Alliance must provide reinforcements to Norway very early in a crisis and it must control the Norwegian Sea to maintain the war effort after the outbreak of hostilities. Four strategic options are considered in this analysis: expansion of deterrence, increased prepositioning, a defensive barrier, and forward defense. Of the four strategies, forward defense is recommended because it is the only strategy that adequately addresses the basic objectives.

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THE UNITED STATES AND TUNISIA: A FOREIGN POLICY ANALYSIS

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The Republic of Tunisia is an Arab Muslim nation whose primary orientation since achieving independence nearly thirty years ago has been towards Westernization and modernization. Its political stability and economic progress have been remarkable. The coming decade, however, promises to be a period of turmoil for Tunisia, as a number of social and political forces are creating an atmosphere of disunity and dissension which can be expected to undermine the national equilibrium.

For the United States, the development of events in Tunisia is a matter of concern. The loss of Tunisia as a voice of moderation in Arab affairs would cause America to lose one of its strongest allies in the region and suffer a loss of prestige and influence in the North Africa/Middle East area. Further, the concept of Westernization as a means to promote human development would be weakened.

This study analyzes the current situation in Tunisia and its implications for the United States in the context of its economic, political and strategic dimensions. American policy goals and options are examined and recommendations for future U.S. policy toward Tunisia are made.

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A FOCUSED COMPARISON OF SOVIET AND AMERICAN NATIONAL INTERESTS IN SOUTHWEST ASIA

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The objective of A Focused Comparison of Soviet and American National Interests in Southwest Asia is twofold. First, to develop a framework for analysis by which to compare the national interests of the Soviet Union and the United States. Because of the problem of mirror-imaging Soviet and American views, this analysis carefully attempts to consider the definition of a national interest from both societal perspectives. Second, to apply the framework of analysis to two related case studies; Superpower interests in Afghanistan and Iran. The Southwest Asian region provides an interesting environment to apply this paradigm because of the significant challenges to both Soviet and American positions in light of the Iranian Revolution and the Soviet invasion of Afghanistan.

This analysis concludes with a brief comparison of American and Soviet interests in the region. Given the geostrategic position of the region, the dominant role of ethnicity in Iran and Afghanistan, and risks to superpower prestige, it is obvious that the Soviet Union has a greater intensity of interests in this region.

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CONFLICT OR CONSENSUS: EAST GERMANY, THE SOVIET UNION AND DEUTSCHLANDPOLITIK 1958-1984

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Visible signs of disagreement over foreign policy between the Soviet Union and the German Democratic Republic have been a rare occurrence. The exception to this condition has been their differing interests in formulating policy on Germany or Deutschlandpolitik. Over the past twenty-five years, several factors have drawn the decisionmakers of both countries in three specific instances to develop a Deutschlandpolitik which led to discernable discord between them. By comparing the leading factors in an organized, methodical manner, with the help of historical case studies, one is able to better understand the most relevant causal factors relative to this discord. When East German and Soviet foreign policy and economic interests are misaligned and the two leaderships have differing levels of control over their foreign policy formulation, the development of conflict or dispute over their respective German policies is most likely. The potential for future differences over this policy issue remains likely as East German leaders work towards alleviating their country's identity problem via foreign policy actions potentially conflicting with Moscow's hegemonal interests.

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THAILAND AS AN ALTERNATIVE TO THE PHILIPPINE BASES PROBLEM: NEW WINE IN AN OLD BOTTLE

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This study analyzes Thailand's potential as a basing alternative, assuming the United States is forced to leave its key facilities in the Philippines. It stresses the U.S. national interest to maintain a strong presence in Southeast Asia; and concludes that support of President Reagan's defense policies infers tacit approval of a Thai basing scenario. It traces the historic friendship of the U.S. and Thailand, analyzes the Soviet/Vietnamese threat in the region and its positive affect on U.S.-Thai relations.

The paper lists and compares Thai and Philippine base physical assets and missions, and concludes that--while the Subic/Clark complex can't be duplicated--Thai bases at Sattahip and Phuket could be used in forward basing scenarios to maintain the U.S. presence in the region, and counter Soviet adventurism. If the U.S. stresses the mutuality of security interests, the Thais will acquiesce to an American presence. Should the U.S. leave the Philippines, Thailand is a militarily and politically viable alternate.

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THE UNITED STATES AND THE SOUTHWEST PACIFIC: POLICY OPTIONS FOR A CHANGING REGION

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This thesis proposes United States policy options for the Southwest Pacific. It examines the political, economic, military, and social environment of the Southwest Pacific. It then details current U.S. economic, military and political interests in the region. The thesis then assesses the threats to U.S. interests and proposes options to negate or minimize the impact of these threats. It is the contention of this writer that the United States must take a more active role in the affairs of the region and bring more political and security interests into the formulation of policies concerning the region, as opposed to previous emphasis on economic ones.

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RENITENCY AND INTEREST BEHIND THE FOG

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The purpose of this work is to discuss the post-World War II and present situation in Poland as a background for establishing the phenomenon of renitency and stalemate existing in Poland today. Polish political culture is then used as a model for explaining the continued opposition of the Poles to Soviet rule and their resistance to socialist transformation on the Soviet model. The discussion of Polish political culture and the identity of its essential Westernness then serves as a starting point for studying U.S. national interest with regard to Poland. The theory of national interest is first reviewed in the American context; a comparison of Soviet and U.S. interest in Poland then follows, using the Nuechterlein and Teti models of the national interest. The work concludes with recommendations for U.S. policy toward Poland based on Polish political culture and U.S. national interest as set forth in this work.

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UNITED STATES NATIONAL INTERESTS IN THE REPUBLIC OF KOREA

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This thesis analyzes the evolution of United States' political, economic, and strategic interests in the Republic of Korea. A discussion on what is the "national interest" and a framework to discuss those interests is provided. United States political interests are discussed by examining the highlights of Korean politics following the Second World War with a focus on current political topics. United States economic interests are viewed in light of the economic progress South Korea has made following the Korean war and potential promise for the future. In discussing the strategic interests of the United States, a regional assessment of the balance of power is made. Special emphasis is placed on current strategic issues. This thesis concludes: 1) The United States has a vital strategic interest in peace and stability on the Korean peninsula which warrants continued security assistance to the ROK and maintenance of U.S. military forces on the peninsula, 2) The United States has a major economic interest in the ROK with growing trade between the two countries and significant U.S. business investments in South Korea, and 3) The United States has a major political interest in continued North-South dialogue as well as a peripheral interest in constitutional reform and human rights in the ROK.

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NEGOTIATION FROM WEAKNESS: ACHIEVING NATIONAL SECURITY OBJECTIVES FROM A POSITION OF STRATEGIC INFERIORITY

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The phrase "negotiating from weakness" has been used as an informal description of an adverse or undesirable relative position for a nation attempting to interact with other members of the international system. As such it has represented the antithesis of "negotiating from strength," a condition considered essential by American foreign policy makers of the nineteen-fifties for successful negotiation with the Soviet Union. This study develops a distinct concept of "negotiating from weakness" in order to examine various approaches that can be used by "strategically inferior" nations to achieve strategic objectives through negotiations. The primary impetus for this study is the erosion of the American strategic position relative to the Soviet Union. Five strategies and twelve corresponding tactics appropriate for negotiating "from weakness" are developed, supporting historical examples are assessed, and general conclusions on the applicability for American foreign policy are presented.

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U.S. NATIONAL INTEREST AND TECHNOLOGY TRANSFER POLICY: THEY MUST BE UNITED

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The purpose of this study is to define the American national interest in such a way that it can be used by decision-makers when formulating technology transfer policy, and to determine the significance of East-West technology transfer to American security.

The initial hypotheses of the study were: 1) how one views the Soviet Union directly affects one's perceptions towards the imperativeness of the linkage between technology and U.S. security; 2) technology is a vital element in U.S. national security; 3) the Soviet Union greatly benefits from the Western technology it receives either overtly or through illegal channels; 4) Western technology positively impacts Soviet economic growth; and, 5) the Soviet Union benefits twice from acquired Western technology, first from the initial incorporation, and second, from the advantages associated with transferring those goods to a Third World client.

The research substantiates all but hypothesis four.

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